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THE SCHOOL REVIEW
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COMMERCIAL TRAINING UNDER STATE SUPERVISION

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"Commercial Training under State Supervision" is a subject which can hardly be said to be in its infancy, but is one which can more appropriately be said not to exist. Commercial education has become a part of the high-school curriculum, not by design, but rather because of the impossibility of disregarding the demand for it. The rapid increase in the number of the high schools offering business training, and the more phenomenal increase in the number of pupils taking this work, are more or less apparent to all. The real growth of commercial education dates back to about 1890. In 1893 there were 15,220 pupils taking the commercial work in public high schools. In 1895 this number had increased to 30,320. During the next twenty years, from 1895 to 1915, the number has increased from 30,320 to 161,250, or over 500 per cent. This growth, however, has not developed because of any directed effort in its behalf, but rather in spite of an effort to the contrary. The demand for commercial training became so insistent that it could no longer be disregarded. Pupils were leaving the public high schools to go to private business colleges for the purpose of preparing for a definite bread-earning career, and taxpayers objected to supporting public institutions which did not train for necessary occupations. Though there is no intention of belittling the "classical" and "cultural" education, it must be

remembered that commercial education is the outgrowth of a real demand for training for useful occupation, and of a general dissatisfaction and opposition to the firmly rooted "classical" and "cultural" training. A study of the percentages of present-day pupils taking high-school studies reveals these facts: English, the most universal of all high-school subjects, has increased, in the period 1890–1905, about 30 per cent; mathematics, about 10 per cent; Latin, 20 per cent; modern languages, 10 per cent; natural sciences, Greek, and civics have actually decreased 10–25 per cent. During the period in which these subjects have had only a very limited growth, and some of them have suffered reverses, commercial education, together with other vocational subjects, have had a phenomenal increase of about 200 per cent. The tendency during this period, as indicated by these statistics, is evident. We may lament the fact that our population is becoming "commercialized," yet the tendency is evident and the fact remains. If we cannot control the tendency the best thing we can do is to adjust ourselves to it. Fortunately, though probably unwillingly, the educational world has, at least partially, heard and heeded the demand for commercial education.

The opposition, if such it may be termed, to commercial education has come from several sources. Business until the last twenty or thirty years was comparatively simple. Our fathers who were successful in business thirty or forty years ago did not have modern conditions of competition, complex labor problems, numerous legislative restrictions, etc., to contend with. The business world was then the most promising field for the man of good judgment and energy. Successful business men often prided themselves on the lack of an education, believing success was based on shrewdness rather than on training. These men regarded the teacher as a theorist and entirely impractical. This opposition had to be overcome, but to the teachers of commercial subjects belongs little of the credit for the change which has been produced. The attitude of present-day business men is due entirely to changed economic conditions. Today the modern business man regards training as just as essential to success in the world of commerce as is a medical training necessary to the success of the doctor or a training in law

essential to the success of the lawyer. The business man recognizes the fact that commercial and industrial supremacy is no longer due to blind chance and sentiment, but that there is necessary to success a thorough understanding of complex commerce and industrial life. There is, everywhere, a genuine indication of the willingness of business interests to co-operate with educational institutions in the effort, and the hope, that there may come from the various institutions of learning men and women who are able to assume responsible positions in this modern, intricate, and complex commercial era in which we live.

The greater drawback to the growth and development of commercial education had its origin within the membership of the educational fraternity itself. Educators, of both secondary and higher institutions of learning, looked disdainfully upon this form of education. Commercial training was cordially spurned because of its "practicability," its "utility," and its ultimate end, "material gain." This distrust has not been entirely eliminated. Our institutions of higher learning still regard commercial training as beneath the dignity of a college study, and still adhere to the contention that the ideal of training for material gain is opposed to the ideal of training for culture. These institutions hold that commercial education is not scientifically administered, and this criticism is at least partially true even if not entirely just. We know there are teachers of commercial subjects who have had little or no training for the particular work which they are doing. The lure of commercial education has been too strong for many. The other departments of secondary education have been readily supplied with teachers, but not so the departments of vocational education. There has been a real scarcity of college-trained commercial teachers and this field has been among the best in educational work. Because of the scarcity of teachers of commerce and business many teachers turned to it, whether properly prepared or not. That this has been a fact we must admit, but we may be pardoned if we turn back to the institutions of higher education and ask, "What have they done to correct this condition, and what steps have they taken to produce an available supply of teachers who are able scientifically to administer commercial training in our secondary schools?"

Colleges and universities uniformly have felt that commercial education was of so inferior a quality that they could not possibly give recognition to it. If commercial training in high school was as poorly administered as they believed it to be, then surely there never was a matter which so thoroughly demanded the earnest attention of the colleges. Two years ago there was not a state college or university giving training especially designed and intended for commercial teachers. A study of the current issue of the annual catalogues of fifty state universities and colleges indicates a very commendable change in this respect. The state universities of South Dakota, Montana, Illinois, California, Oregon, Nebraska, and Minnesota make very special reference to the courses for the training of commercial teachers (see Table II). The summer-session announcement of the University of Wisconsin does likewise. Among the privately endowed institutions, the University of Chicago, Wharton School of Commerce, Columbia University, Leland Stanford Junior University, New York University, and the University of Pittsburgh make prominent mention of this course. The fact that the institutions mentioned are giving attention to the matter of the training of commercial teachers is indicative of greater future success for business training.

Not only are the state institutions recognizing a duty in the training of commercial teachers but they have also accepted the demand for commercial education in other particulars. In 1880 the Wharton School of Commerce and Finance was organized as the first institution of higher learning to give a complete course in business training. This fall, of the fifty state colleges and universities included in Table II, forty-six are offering courses in commerce. Of the remaining four institutions which do not give courses in business training two are strictly technical educational institutions and would not be expected to give commercial courses. These institutions have, however, been included in the compilation because they are representative state institutions of the states in which they are located. In addition to the institutions included in the compilation there are numerous privately endowed colleges and universities which also offer courses in commerce. Four of the state universities and one state college mentioned in Table II,

TABLE I

Name of Institution	Units Required for Entrance	Total Prescribed Units	Elective Units	Maximum Commercial Units Accepted
Cornell University	15	11	4	0
Delaware College	Will accept high-school graduates			
Indiana University	16	11	5	5
Louisiana State University	14	7½	6½	3
Massachusetts Institute of Technology	14	12	2½	0
Miami University	15	11½	3½	0
Ohio State University	15	11	4	1
Ohio University	15	0	15	15
Pennsylvania State College	14	13	1	0
Purdue University	15	9½	5½	1
Rhode Island State College	14	9	5	1
Rutgers College	14½	14½	0	0
State College of Washington	15	9½	4½	2
State Teachers' College of Colorado	15	0	15	15
State University of Iowa	15	8½	6½	3
State University of Kentucky	15	11½	3½	3
State University of Nevada	15	8	7	1
University of Alabama	14	13	1	½
" " Arizona	15	9½	5½	5½
" " Arkansas	14	3	11	4
" " California	15	10	5	3
" " Colorado	15	13	2	½
" " Florida	16	8	8	8
" " Georgia	14	12½	½	0
" " Idaho	15	11	4	4
" " Illinois	15	9½	5½	2
" " Kansas	15	11½	3½	1
" " Maine	14	10½	3½	0
" " Michigan	15	8	7	2
" " Minnesota	15	6	9	4
" " Mississippi	14	7½	6½	3
" " Missouri	15	7	8	1½
" " Montana	15	10	5	4
" " Nebraska	15	9	6	1
" " New Mexico	15	9½	4½	4
" " North Carolina	14	13.7	.3	0
" " North Dakota	15	9	6	3
" " Oklahoma	15	9	6	1
" " Oregon	15	9½	5½	½
" " South Carolina	11	7½	3½	2
" " South Dakota	15	5	10	?
" " Tennessee	14	9½	4½	3
" " Texas	14	10½	3½	1½
" " Utah	15	6	9	2
" " Vermont	14½	12½	2	1
" " Virginia	14	10½	3½	0
" " Washington	15	11½	3½	2
" " Wisconsin	14	6	8	4
" " Wyoming	15	7	8	2
West Virginia University	15	9	6	1

TABLE II

Name of Institution	Is Course in Commerce Offered?	Does It Offer Training for Commercial Teachers?	Does It Inspect High-School Commercial Work? How?	Has There Been Improvement under Such Inspection?	Would There Be Improvement if Inspected by Expert in Commerce?
Cornell University	Yes	No	Regular	Begun 1914	
Delaware College	"	"	No		
Indiana University	"	"	"		
Louisiana State University	"	"	Regular	Yes	There would be
Massachusetts Institute of Technology	No	"	No		
Miami University	Yes	"	Regular		
Ohio State University	"	"	"		
Ohio University	Yes	"	"		
Pennsylvania State College	"	"	"		There would be
Purdue University	No	"	"		Not general
Rhode Island State College	"	"	"		
Rutgers College	Yes	"	"		
State College of Washington	"	"	"		
State Teachers' College of Colorado	"	Yes	Auditor	Kills initiative	
State University of Iowa	"	No	Regular	Yes	
State University of Kentucky	"	"	Supervisor		
State University of Nevada	No	"	Regular		
University of Alabama	"	"	Regular	Little attention	to commercial
" " Arizona	"	"			
" " Arkansas	"	"	Regular	Yes	No doubt
" " California	"	Yes	Regular		
" " Colorado	"	No	No		
" " Florida	"	"	Regular	Yes	Sound educational
" " Georgia	"	"	"		Think so [plan
" " Idaho	"	"	"		Good
" " Illinois	"	Yes	"		
" " Kansas	"	No	Visitor		
" " Maine	"	"	No		Given no study
" " Michigan	"	"	Regular		

" " Minnesota	"	Yes	"	.....	.....
" " Mississippi	"	No	"	.....	There would
" " Missouri	"	"	"	.....	Yes
" " Montana	"	Yes	No	.....	Certainly
" " Nebraska	"	Yes	Regular	.....	Yes
" " New Mexico	"	No	"	Yes	Only feasible
" " North Carolina	"	"	No	.....	.....
" " North Dakota	"	"	Regular	Yes	Practical plan
" " Oklahoma	"	"	"	.....	Good plan
" " Oregon	"	Yes	No	.....	Certainly
" " South Carolina	"	No	Regular	Yes	.....
" " South Dakota	"	Yes	"	.....	.....
" " Tennessee	"	No	"	.....	.....
" " Texas	"	"	Special	Yes	Yes indeed
" " Utah	"	"	Regular	.....	.....
" " Vermont	"	"	No	.....	.....
" " Virginia	No	"	"	.....	No information
" " Washington	Yes	"	"	.....	Cannot say
" " Wisconsin	"	"	Special	Yes	Certainly
" " Wyoming	"	"	No	.....	.....
West Virginia University	"	"	Regular	.....	.....

Most of these institutions are members of an association of colleges, and the inspection of high-school work is left to that organization.

namely, Louisiana State University, University of Montana, University of South Dakota, University of California, and the State Teachers' College of Colorado, include in their courses in commerce the subjects of stenography and typewriting and give credit for these subjects toward the Bachelor's degree.

Table I brings out another fact which is of very material significance. Of the fifty colleges and universities tabulated, forty-one now accept from ½ to 8 high-school units in commerce of the 14 or 15 units required for entrance to these institutions. The state colleges and universities have been rather active along this line and the high schools should not be unnecessarily alarmed about this feature of their commercial curriculum. These state institutions have always responded actively in so far as entrance credits are concerned. They have been, and always will be, very ready to accept toward entrance those subjects which are a part of well-regulated high schools.

The foregoing statements are an attempt to bring out, first, the importance which commercial education has attained in both secondary and higher education, and secondly, the opposition which this form of education has had to overcome. These factors are significant and they have a bearing on the subject of "Commercial Training under State Supervision." That form of education for which the Reports of the Commissioner of Education for 1895 and also for 1915 show an increase in numbers enrolled of over 500 per cent during the last twenty years; that form of education which is now being offered in some form or other in 73 per cent of public high schools; that form of education which is maintained in important established departments of 2,191 public high schools; that form of education which is offered in forty-six out of fifty state colleges and universities; and that form of education which is preparatory to the life-occupation of 20 per cent of all college and university graduates, being exceeded in numbers by only one other occupation, namely, —teaching—has attained such importance that it cannot longer be denied. Business training has been given recognition by both universities and secondary schools and has become so firmly established that it now devolves upon educators so to administer this training that the best results may be accomplished and the desired ends

attained. And this is the task which must presently be given careful consideration by the state educational bodies. In order to accomplish the desired purposes of commercial education there must necessarily be pressure brought to bear which will tend to unify this form of training in secondary schools. Courses of commercial study must be more carefully planned, there must be a closer relationship and proper sequence of business training in secondary schools and institutions of higher education, and some definite steps must be taken to produce an available supply of properly trained teachers of these subjects.

State supervision of commercial education is essential to the proper establishment of this popular and growing field of training. That this is necessary and essential to its proper development cannot be seriously questioned, but the form of supervision and with whom it shall rest are questions upon which there may be a greater variation of opinion. As stated at the outset, state supervision is not even in its infancy—rather, it does not exist. It would appear that there are available two methods of state supervision which would be effective: supervision by the state central educational body—namely, the department of the state superintendent of education—or supervision through the state university.

Before attempting to indicate a preference for either of these methods it may be well to note what has been accomplished by the two forms of supervision in so far as other secondary-school studies are concerned. The state department of education of each of the forty-eight states has without question rendered an invaluable service in the development of secondary education. The value of unification of high-school subjects, provision for the proper qualification and certification of teachers, provision for length of the school year, and the constructive aid rendered through the inspection of secondary-school work, and the enactment of sound educational legislation, must be attributed to the state department of education. But in spite of the efforts of this department there remains much to be accomplished. This is especially true in so far as it relates to the proper and scientific presentation of high-school subjects. There seems to be a lack of incentive on the part of the school authorities to comply strictly with the suggestions made by

the central educational body. The suggestions made by it are too frequently regarded much in the same light as are the suggestions and orders of any superior authority. It is also a fact that the state department of education is now overcrowded with the various and numerous demands made upon it and as a result much of the inspection of high-school work is not being carried out as was originally intended. Table III is a compilation of answers obtained from the departments of education of forty-eight states. This compilation brings out the fact that in ten states no attempt is made to inspect commercial training in the high schools. Of the thirty-three states where this work is inspected and supervised, in only two, California and New York, is this inspection done by an authority on vocational education. On the basis of this statement it could hardly be expected that business training should have attained a rank of merit. Nor is it probable that the central educational body of the state will find time in the future properly to supervise this important field of secondary education. The state of New York, through its central educational body—the Board of Regents—supervises all work in high schools. This supervision is very complete, extending even to the giving of examinations in all high-school subjects. The plan has been productive of much good, especially in so far as uniformity of courses of study, subject-matter of the course, number of hours allotted to each subject, and matters of that nature are concerned. The plan is not as satisfactory as one would believe if the words of teachers working under it are a fair criterion of its merits. The objection to the plan lies primarily in the *method* used to accomplish the desired end. While the supervision of high-school work is performed by experts in each high-school study, yet the supervision itself is not as complete as it should be. The Board of Regents depends very largely on the "Regents' Examination" to produce the kind of school work it desires. There are in the service of the Board of Regents examiners and supervisors who are experts in the work they supervise, but the supervision is inadequate, owing to a force insufficient for proper supervision. This has been the universal experience with supervision by the state department of education. If the states were willing and ready to employ a sufficient number of special

inspectors and supervisors, on the plan adopted and in use with the Board of Regents of New York, much could be accomplished.

The second method of supervision of high-school work to which reference has been made is that of inspection and supervision through the agency of the state university or state college. The inspection of secondary-school work had its origin in the action taken by the University of Michigan. About 1870 this institution began the inspection or visitation of high schools for the purpose of accepting high-school credits toward university entrance requirements. Other state institutions quickly followed the lead of the University of Michigan, and during the next twenty years this became a common practice of most of the higher educational institutions. The *method* of inspection is more significant than the fact that inspection was carried on. Each department of the institution sent out one of its members, generally the head of a department, to inspect the work of the high school in that particular line of work. This constitutes an early recognition of an important fact, namely, that supervision and inspection of secondary-school work should be done by experts in that field of education upon which it is desired to pass judgment. The number of high schools increased very rapidly, the curricula of high schools became varied, and the number of institutions of higher education also increased. As a result of the two first-mentioned facts, inspection became a financial burden to the institutions conducting this work. The increase in the number of institutions conducting such inspection and investigation gave rise to another objection, namely, each institution was inspecting the work of high schools which had been inspected by some other institution. There was an unnecessary and expensive duplication of work. It is because of this fact that associations of colleges were formed, such as the North Central Association of Colleges and Secondary Schools, in 1901, and the Association of Southern Colleges and Secondary Schools, and other similar associations.

The inspection of secondary schools has continued and exists today to a more marked extent than ever before. The results obtained through university and college inspection have been very gratifying. Much of that which is good in secondary education at

the present time is directly due to the efforts of these institutions of higher learning. Colleges and universities have exerted an influence upon the thoroughness of secondary education which is second to no other influence. Secondary schools, because they desired to have their graduates admitted to these higher educational institutions, and because they wished to be well thought of by these institutions, have yielded to the suggestions made to them. While we often hear the criticism that secondary schools are catering to the demands of colleges and universities, and only a relatively small percentage of the high-school graduates enter college, yet it cannot be seriously denied that what is good for the college and university is also good for the boy or the girl. Boys and girls do not, and will not, suffer greatly because of the restrictions and demands made upon the secondary schools by the colleges and universities.

Of the two methods of inspection of high-school work there is little doubt of the superiority of the latter-mentioned method. The inspection on the part of the colleges has been more thorough and more productive of good. Quotations from the sixth, seventh, and ninth annual reports of the New England College Entrance Certificate Board are very striking. This organization was formed for the purpose of inspecting and accrediting secondary schools to the colleges and universities comprising its membership. In those cases where the secondary school was not accredited through inspection, graduates were admitted to the colleges upon examination. The sixth annual report contains this statement: "It appears from the tables that the percentage of failures [in college] among those who enter on certificate is much lower than among those entering on examination." The seventh report again contains this statement: "The percentage of failures among those entering on certificates continues much lower than among those who enter on examination." The ninth annual report reads: "From this it appears that the number of failures among those entering on examination is relatively half as many again as among those entering on certificate. This difference between the two classes persists from whatever point of view we regard the statistics." These statements are important. They indicate to some extent the value of inspection to secondary work. The schools whose graduates are

admitted to college upon the completion of the high-school course feel a keener interest in the proper preparation of the pupil than do those institutions whose graduates must depend upon themselves and their own efforts in order successfully to pass college-entrance-requirement examinations.

In Table III, of the thirty state departments of education which comment on the value of inspection and supervision of high-school work, twenty-three hold that there would be improved commercial work in the secondary schools if that work were properly supervised. Seven states report to the contrary. The reports made by these seven states are, however, influenced more by the thought of the expense involved in such inspection and supervision than they are by the conviction that such inspection would not be productive of good. Table III shows the attitudes taken by the state colleges and universities. In answer to the question, "Would there be improvement in the standard of commercial education in high schools if this work were inspected carefully and by specialists in commercial education?" twenty state institutions commented. Seventeen answered in the affirmative, two reported that they had no definite information on which to base an answer, and one lone institution objected to inspection in any form on the ground that such inspection or supervision killed initiative.

There is little doubt of the desirability of inspection and supervision of high-school commercial training. However, those who are engaged in secondary commercial education are, and justly may be, opposed to the kind of inspection which the state institutions are doing at the present time. So long as they continue to pass judgment on the work of every department of the high school, just so long will there be ineffective and worthless inspection and supervision of secondary commercial training. It is not plausible, much less probable, that there are in these state institutions men who are qualified to pass judgment on every phase of secondary education, and also qualified to render constructive criticism with reference to such education. What is needed is not inspection, but helpful and constructive suggestions with reference to commercial training, and this aid cannot be given except by one who is properly and adequately trained in commercial pursuits and practices in all lines and phases of commerce and industry. This is a work in which the

TABLE III

STATISTICS OF STATE DEPARTMENTS OF PUBLIC EDUCATION

	Do the State Normal Schools Give Commercial Course?	Does Department of Education Inspect High-School Commercial Work?	By Whom Is This Done?	Would Inspection of High-School Commercial Work by Specialists in Commercial Education Tend to Improve That Work?
Alabama	No	Yes	Regular	.....
Arizona	.....	.....	.....	.....
Arkansas	No	Yes	Regular	.....
California	"	"	Special	Yes
Colorado	.....	.....	.....	.....
Connecticut	No	No	.....	.....
Delaware	"	Yes	County superintendent	Very much
Florida	"	No	.....	Yes
Georgia	"	"	.....	.....
Idaho	"	Yes	Regular	.....
Illinois	Yes	.....	.....	.....
Indiana	No	Yes	Regular	Believe so
Iowa	"	No	.....	.....
Kansas	Yes	Yes	Regular	It would
Kentucky	No	No	.....	No
Louisiana	"	Yes	Regular	.....
Maine	"	"	"	It should
Maryland	.....	.....	.....	.....
Massachusetts	Yes	Yes	Regular	Very Valuable
Michigan	"	No	.....	Present satisfactory
Minnesota	No	Yes	Regular	.....
Mississippi	"	No	.....	Yes
Missouri	Yes	Yes	Regular	.....
Montana	No	"	"	It might
Nebraska	Yes	"	"	Not at present
Nevada	No	"	"	Undoubtedly
New Hampshire	"	.....	.....	.....
New Jersey	Yes	Yes	Regular	Yes
New Mexico	No	"	"	Certainly
New York	.....	"	Special	Yes
North Carolina	Yes	"	Regular	Yes
North Dakota	.....	.....	.....	.....
Ohio	No	Yes	Regular	Probably
Oklahoma	"	"	"	"
Oregon	"	"	"	Possibly
Pennsylvania	Yes	"	"	"
Rhode Island	No	"	"	Probably
South Carolina	.....	"	"	.....
South Dakota	Yes	"	"	Doubtful
Tennessee	"	"	"	Rarely
Texas	"	No	.....	No
Utah	No	Yes	Regular	.....
Vermont	"	No	.....	No
Virginia	"	Yes	Regular	Yes
Washington	Yes	"	"	.....
West Virginia	No	"	"	Probably
Wisconsin	Yes	"	"	Yes
Wyoming	No	No	.....	Would

state institutions have been very weak, and because of the general and traditional opposition to commercial training this particular field of vocational training has received only very little aid from the higher institutions of learning. There has been no co-ordination between secondary and higher educational institutions in the matter of commercial education. A change in policy is bound to come and the time is not very far distant.

Two state institutions have resorted to inspection of secondary commercial training by specialists in commerce; they are the University of Wisconsin and the University of Texas. These institutions apparently have recognized the importance of commercial education in the secondary schools of the states from which they draw the majority of their students, and have taken it upon themselves to direct the business training in the high schools of their states to the end that it may eventually be properly and scientifically administered in these high schools. The departments of education of both institutions very enthusiastically indorse the plan which has been in practice for a little over two years. Professor Treleven, of the University of Texas, and Professor Morton of the University of Wisconsin, under whose direction this inspection of high-school commercial work has been carried on for their respective institutions, have no doubt been able to produce results which have been gratifying to the institutions which they have represented. Time will not permit an extensive discussion of the details of the work of inspection of both these institutions, and yet it seems necessary to point out some of the possibilities of this entirely new form of high-school supervision.

A quotation from a report of the Committee of School Visitation of the University of Texas will best serve to indicate the results accomplished through the specialized supervision and inspection of commercial education in Texas high schools. The report reads in part:

> Until two years ago the commercial work in Texas high schools was extremely poor. . . . . We immediately availed ourselves of Professor Treleven's assistance and a new era was opened for business training in the high schools of this state. . . . . The schools are not only willing, but are anxious for the visits. Furthermore, they are always ready to better their work when they receive proper instruction. . . . . I may say, without hesitation, that very great changes have come in methods, in equipment, and in

results in the commercial work of our schools as a direct result of sympathetic and helpful visitation."

It is probably not amiss to say that the Committee on Accredited Schools of the University of Wisconsin was originally indifferent to commercial education in secondary schools, and in the University as well, if it did not actually oppose such education. Under the direction of a man thoroughly trained in commerce, one who had strengthened and supplemented training with actual practical experience, a man possessed of rare judgment, capable of passing fairly and constructively upon the value of high-school commercial work, it was hardly possible to do otherwise than produce desirable results. Professor Morton, the inspector for the University of Wisconsin, has brought about a marked change in Wisconsin high-school commercial work in the two years of his efforts in that direction. The inspection of business training in Wisconsin was carried forward as it has never been before. His inspection consisted in careful investigations of methods of teaching, qualification of teachers, equipment of the department, standardization of commercial courses, adjustment of time allotted to various subjects, and the giving of really helpful and constructive criticism. In the judgment of the Committee on Accredited Schools the conditions which were revealed were sufficient compensation for the work involved in inspection. But it is safe to make the statement that commercial training in those high schools which were inspected has materially improved. This fact is attested by the members of the Committee on Accredited Schools and is borne out by the statement of high-school teachers of commercial work in the state of Wisconsin.

It would appear that this is the most logical method of procedure in an attempt to bring commercial training to the level which it deserves. The universities have wielded a powerful influence upon secondary education through the inspection of high-school work. They can do likewise with that form of education which now ranks fourth in the percentage of units of all high-school work. But this inspection must be instituted and carried on by men who are especially well trained, and experienced as well, in commercial work. The teachers of commercial subjects would welcome constructive inspection and supervision, but they wish to be judged by those who

are capable of passing judgment on their work. We do not want a professor of English, mathematics, or Greek to inspect our work and attempt to make comment thereon. If the state universities desire to do something really beneficial to commercial education in the high schools of their respective states, they should engage the services of trained experts in commercial education and send such experts among us to inspect and give helpful suggestions. Let the state university suggest what would be the proper commercial curriculum and how best to administer training in the subjects which are included in such a course of study.

When the state universities undertake this work one thing is quite sure to come with it. The universities will then feel a more thorough responsibility toward a duty which properly belongs to such institutions; namely, they will recognize the fact that if the universities are to pass judgment on secondary commercial training they have their own interests to protect, and that the interests of the universities will best be preserved if they takes active steps to produce an available supply of properly trained commercial teachers. If 25 per cent of the graduates of all colleges enter the teaching profession, then surely a department of education which has attained the proportions which commercial education has reached should be given proper recognition. That this state of affairs is now fairly well on its way has been mentioned earlier. Seven state institutions are giving special attention to this work. It will be interesting, in this connection, to observe, within the next few years, the movements of the University of Oregon. Professor Morton, the former inspector of commercial training at the University of Wisconsin, has assumed the position of director of the Department of Commerce at the University of Oregon. Because he is a thoroughly practical commercial educator it will be interesting to see what takes place in Oregon. His work as inspector was a revelation and an inspiration, and the results he accomplished were most convincing. He will, no doubt, put into practice to an even greater extent the knowledge gained through his experiences in his former position. Being thoroughly convinced, personally, that state university inspection of secondary commercial work is the only real solution of the state supervision of that work, I look eagerly to the work which Professor Morton is certain to do in the state of Oregon.

When the state universities fully recognize that they have a duty to perform, and when they take it upon themselves to train teachers properly for the most rapidly growing form of education, then may we hope to see greater improvement in commercial training. A commercial teacher of the present needs more than an elementary knowledge of bookkeeping, stenography, typewriting, and commercial law. These branches are now recognized as merely technical, though very important. More important for the commercial teacher is a broad knowledge of commerce and finance, and clear perception of the relationship between technical subjects and the general science of business, a knowledge of the psychology of business, and a knowledge of methods of teaching commercial subjects. Seeing that commercial teachers are so qualified is the work which the state universities must perform. There now are fourteen states in which the state normal schools give training for commercial teachers, but this work should also be undertaken by the colleges and universities, if we wish to have teachers of business training as well trained as teachers of other subjects. We need more business men with a clear knowledge of the nature of industry and a body of men with a higher standard of business ethics. It is the duty of the public educational institutions to provide this necessary training. Both secondary and higher institutions of learning have responded generously to the public demand for commercial education, but much remains to be accomplished.

The state institutions will probably argue that specialized inspection and supervision of high-school studies will involve an expense which is too great to bear. The cost of specialized supervision may be high, yet it is relatively no higher than is the cost of doing well any other kind of work, and it is only that work which is well performed which is worth even limited expenditures of effort and money. It is possible to provide for state college or state university specialized inspection and supervision of high-school studies through the college associations of which the various institutions are members. The association may be able to do the desired work with entire satisfaction to all parties concerned. In addition to being a more economical plan it presents features and possibilities which seem worthy of further consideration and serious

thought. If the various college and university associations of the United States desire to pass judgment on the work of high schools, they should recognize more fully the fact that only specialists in any one field of education can pass properly, fairly, and constructively upon the value of secondary-school work. Commercial education has become so important a part of secondary education that supervision and inspection by men trained in commercial education may legitimately and justly be demanded for it.

Let the state universities and state colleges supervise and inspect commercial education in secondary schools through whatever agency seems most expedient, but let that supervision be performed by those who are capable of rendering expert constructive aid. Two state institutions have paved the way and others may easily profit by their experiences. The inspectors for the University of Texas and the University of Wisconsin have accomplished results which cannot be overlooked, and which are sufficient proof of the desirability of supervision of high-school commercial work by men who are experts in that field of education. Let us hope that the state institutions in general will very early put into practice a systematic method of supervision of high-school commercial work, and may these institutions also make proper provision for the perpetuation of scientifically administered secondary commercial training through the establishment of commercial teachers' training courses.

Now a word to the teachers. It is futile to attempt to justify commercial education on the ground of its practicability. The practicability of a high-school subject does not determine its value. After all is said and done, the ultimate concern must be the boy or the girl. What does the subject do for the pupil? That subject which is retained in the high-school curriculum for no better purpose than its practicability had better be eliminated from the curriculum. A commercial subject must be "cultural" as well as "practical," if we may use those terms. Certainly it is essential that there be a closer relationship between the various groups of teachers, and each will have to concede to the other fields of education, but each must fully recognize the more important fact that subject in itself is not the end, but that the boy and the girl are the objectives in education.

GENERAL SCIENCE SITUATION IN IOWA AND CALIFORNIA

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Whether in favor of a first-year general science course for the high school or not, anyone well informed upon the subject will admit that in many cases the special science courses in the first years of the high school have not proved satisfactory. The following is a report of an investigation carried on under the direction of Dr. Otis W. Caldwell, and is one of several investigations which bear upon the organization of high-school science. This study was not an attempt to solve the problem, but an endeavor to find the facts as they exist, directly from the people at work in secondary education. These are the people who are in a position to know the real needs of the pupils and who should be the ones to find the ultimate solution.

The questionnaire method was used, not because it is free from error, but because it seemed to be the best way to obtain the desired information. The nature of the questions will appear from the tables. The answers from Iowa were nearly all received during the last two months of 1914; those from California during the early part of 1915.

Two states, widely separated geographically, were selected. With one or two exceptions the questions sent to the two states were the same. In Iowa the course has been introduced recently. In California the work has been given since 1906. The widespread interest in both states has been shown by the large number of answers received, as well as by numerous personal letters from teachers and superintendents.

In Table I will be found the number of letters sent out, the number of replies, and the number of schools offering general science. Table II gives the date of introduction in the two states. Table III shows that in these localities general science may be considered as

a first-year subject. As would be expected from a new course introduced in the first year, as yet many of these schools permit

TABLE I

Enrolment	No. of Letters		No. of Answers		No. Having General Science	
1913–14	Iowa	California	Iowa	California	Iowa	California
200+	40	55	30	50	11	25
100–199	87	53	61	47	11	28
50–99	71	71	44	61	9	27
49–	30	46	18	38	2	19
Total	228	225	153	196	33	99

TABLE II

Date of Introduction of General Science

California		California		Iowa	
Date	No. of Schools	Date	No. of Schools	Date	No. of Schools
1906	1	1912	22	1911	1
1907	1	1913	19	1912	3
1908	2	1914	15	1913	9
1909	0	1915	6	1915	20
1910	19	Unknown	10		
1911	4				

TABLE III

Year in Which General Sciences is Given

	No. of Schools	
	Iowa	California
Number of schools offering general science in first year	31	84
" " " " " " " first or second year		12
" " " " " " " second year		2
" " " " " " " second or third year	1	
" " " " " " " third year	1	
" " " " " " " fourth year		
" " " admitting pupils from other than the regular years	20	87
Number of schools not so admitting other pupils	13	10

other than first-year pupils to enter. Table IV may perhaps show a tendency, with longer experience, toward a full-year course, while

Table V indicates a very unsettled condition regarding the amount of time per week which the work receives. Table VI points to the acceptance of the field and laboratory method. In Table VII we see

TABLE IV

TIME PER YEAR GIVEN TO GENERAL SCIENCE

	No. of Schools	
	Iowa	California
Number of schools offering general science one year	12	82
" " " " " " one-half year	21	8

TABLE V

TIME PER WEEK GIVEN TO GENERAL SCIENCE

	No. of Schools	
	Iowa	California
Number of schools offering general science 1 hour per week		1
" " " " " " 3 hours " "	2	
" " " " " " 3½ " " "		2
" " " " " " 4 " " "		3
" " " " " " 5 " " "	29	8
" " " " " " 6–7 " " "	2	
" " " " " " 7 " " "		19
" " " " " " 8 " " "		6
" " " " " " 9 " " "		1
" " " " " " 10 " " "		19

TABLE VI

LABORATORY AND FIELD WORK

	No. of Schools	
	Iowa	California
Number of schools offering laboratory work	30	97
" " " " field work	19	82
" " " " field and laboratory work	15	82
" " " " neither field nor laboratory work	3	

that in a majority of cases there has been no recognized displacement of other subjects. One of the objections which has sometimes been offered against the introduction of general science is that the

teacher must be more broadly trained than is required for the old plan of special science courses. A glance at Table VIII will show

TABLE VII

SUBJECTS DISPLACED BY GENERAL SCIENCE

SUBJECT	NO. OF SCHOOLS	
	Iowa	California
Botany	1	2
Commercial geography	1	.....
Latin	3	.....
Physical geography	6	35
Physics	1	.....
Zoölogy	2	.....
None	15	62
Not mentioned	4	.....

TABLE VIII

SUBJECTS NOW BEING TAUGHT BY TEACHERS OF GENERAL SCIENCE IN IOWA

Subjects	No. of Teachers
General science, algebra, and bookkeeping	1
" " physics, and mathematics	2
" " " physiology, and geometry	1
" " " and physiology	4
" " " and history	1
" " " botany, and algebra	1
" " " and Latin	1
" " " and English	1
" " " Latin, and English	1
" " " and agriculture	1
" " " agriculture, physiology, physical, geography, and botany	1
" " botany, zoölogy, and geology	1
" " " physical, geography, and agriculture	2
" " " domestic science, and agriculture	1
" " and mathematics	1
" " manual training, and agriculture	1
" " " " geometry, and athletics	1
" " mathematics, and other science	1
" " chemistry, and agriculture	1
" " and chemistry	1
" " " agriculture	1
" " " domestic science	1
" " " other science	1

what subjects the science teachers of Iowa are now teaching—anywhere from one to five other subjects require a considerable degree

of "broadness" of training without regard to the general science. By mistake this question was omitted from the papers sent to California. In Table IX will be found a summary of opinions given. In nearly every case where the subject has been dropped, the reason given was lack of a suitable text or of a competent teacher. In no case was dissatisfaction with the course itself given as the reason.

TABLE IX

OPINIONS REGARDING GENERAL SCIENCE

	No. of Schools	
	Iowa	California
Number of answers in favor of general science	103	155
" " " not in favor of general science	13	27
" " " not giving an opinion	37	13
" " schools expecting to introduce general science in the near future	19	10
Number of schools having dropped general science	.....	15

Those to whom the letters were sent were asked to give their opinions about the course but were not asked to give reasons for the opinions. I have attempted to classify these replies, in so far as was possible, placing the ideas stated in the same or similar words together. Since there was no special difference in the answers from the two states, I have not given them separately.

OPINIONS REGARDING GENERAL SCIENCE	No. of Answers
"Fine for those who take other science, because it lays a good foundation and makes the pupil familiar with scientific method."	65
"Fine for those who take no other science in later years, or those who leave early, because it gives general information."	35
"Good for all. Gives survey of whole field."	4
"Holds boys better than any other course offered."	2
"Interests boys otherwise backward."	1
"Reaches many pupils with general science knowledge not otherwise reached."	2
"Does more for pupils who leave early than does physiography."	1
"Keeps pupils in school."	2
"Valuable where little science is given."	2
"Stimulates desire to know more science, and increases size of later science classes."	8

	No. of Answers
"Good for technical schools."	2
"Good for night schools."	1
"Good preparation for agriculture."	6
"Helps pupil to select future work."	5
"Practical and adapted to local needs."	7
"Explains common phenomena without too much detail."	7
"Causes pupils to think and observe."	6
"It is mind-broadening."	1
"An informational course."	6
"Has human interest and great educational value."	5
"Best and most economical course a school can offer."	1
"Pupils are much interested."	12
"It teaches self-reliance."	1
"It connects classwork with applied science."	2
"It correlates the various sciences."	3
"The teacher must be broadly trained."	41
"Would teach it if it were possible under our conditions of few teachers and poor equipment."	1
"Of great value in the eighth grade."	3
Those who gave lack of text as the reason for not having the course	4
"Too general."	9
"Not complete."	2
"Lacks unity and continuity of a basic subject."	8
"A smattering of everything."	7
"Not standardized."	1
"Out of harmony with present tendency of specific courses."	1
"Poor substitute for special courses."	1
"Physiography is more definite."	5
"Not as good as physiography with the emphasis on the human side."	1
"Not as good as physiography for a small high school."	1
"No need for it."	1
"There is no such thing."	1
"With agriculture we do not need it."	4
"Agriculture better adapted to local needs."	1
"Poor now because of lack of prepared teachers and good texts."	13
"Colleges do not credit it."	2
"Cannot have everything and we must meet university requirements."	1

THE TRAINING OF ELEMENTARY SCIENCE TEACHERS

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In the following article it is pointed out that high-school science is of two kinds, one kind running down into the upper grades, the other running up into the colleges. The former is described as *general elementary science;* the latter as *intermediate science.* It is submitted that this differentiation should operate in the training of teachers, somewhat as differentiation now operates in the training of teachers for different parts of the elementary school. Argument is made for a general four-year program, designed for the training of teachers of elementary science. An outline of content of such a program is presented. "Administrative equivalence" of upper high-school and lower college work is discussed, and the proposal submitted that training in the method of high-school courses should be given in teachers' colleges by the teacher of such equivalent college courses.

Plans for improvement of science in secondary education depend for success upon improvement of teaching. The faults in organization and choice of subject-matter become relatively minor matters when compared with faults in teaching. Courses whose content seems irreproachable fail through poor teaching, while those whose content and organization seem faulty are, when skilfully taught, very evidently successful. Adjustments of courses and their content may improve the opportunity for good teaching, but these things by no means insure that good teaching will be done. Reorganization is only the beginning of the task; it is futile if good teaching fails to follow it.

One cause of poor teaching.—One factor that contributes to poor science teaching has not been sufficiently recognized. I refer to the combination of classes too large and of teaching hours too many which is frequent in the larger high schools. It is common to find teachers in large high schools teaching five classes a day with nearly forty pupils to the class. Usually such teachers are well trained and well paid, but such a burden of work reduces the best of them presently to routineers. The superintendent would relieve such pressure, if the budget permitted it. Unwillingness to improve

such conditions is not properly chargeable against school administration. But it is properly chargeable that the waste involved in such situation is not sufficiently appreciated. Good teaching of natural science calls for more of outside work on the part of the teacher than does the teaching of most subjects. Yet allowance for this is usually not made in practice. The loss involved in allowing science classes to exceed twenty-four pupils, and the science teacher's teaching hours to exceed four a day, is quite demonstrably in excess of the added room and teacher cost that will relieve such pressure. To exceed the maxima indicated is not economy; it is waste.

The period of training.—Certainly much may be done to improve present conditions, but it is more especially to the recruiting of the ranks of the science teachers that this article seeks to direct some attention. The recruits are college graduates. Already some high schools require of new teachers a certain amount of graduate work, as well as teaching experience or in lieu thereof, but the day when this will become general is remote. As to a beginner's training, we must content ourselves now with four years of post-high-school work as the reasonable expectancy.

Need of conscious direction.—If this four years of training is to be most effective, it needs conscious direction throughout; conscious direction on the part of the student as well as on the part of his teachers toward the specific goal of high-school science teaching. As things are now, some thousands of college graduates each year begin as high-school teachers. How many of these undertook the whole or even a considerable part of their undergraduate work with a specific view to teaching? How many, however, soon come to wish they had?

Many will doubt whether now or in the future it will be possible to find any considerable number of college Freshmen ready to accept high-school teaching as their calling; ready to shape their undergraduate work with that as the specific view. And, even if this were so, only a few colleges, except teachers' colleges, are equipped to offer such a program as would be requisite under such a plan. This second point is conceded, and what follows applies only to teachers' colleges and to the larger universities. But the

first point is at least open to argument. Differentiation of courses with view to subsequent occupations has come to be an accepted principle in high schools and even threatens to invade the upper grades. Yet the college Freshman is often more immune from differentiation than he was in the grades through which he has already passed. To be sure, the Freshman's choice of law, or medicine, or engineering as a star by which to steer his undergraduate course is sanctioned by usage. But the acceptance of teaching as a profession is usually postponed by undergraduates as long as possible. Nor has there yet developed any tradition of stimulation by deans or Freshman advisers of young inclinations toward teaching.

Recruiting of high-school teachers.—So we think that Freshmen who will undertake their courses from the first with a view to teaching must arrive on the campus with their minds already made up. This puts the matter quite squarely up to the high-school teachers themselves. It is they who need to be the recruiting officers for their own educational brigade, if its quality is to be improved. They must perpetuate themselves. By advice to others they must seek to correct the shortcomings of their own training and the lateness of their own vision.

I write of their vision because such recruiting never will be done by a teacher who has had no vision of a brighter future for science teaching. It is common for science teachers to have a few devoted followers in the Senior class, a few who would become what they are. But it is uncommon for the teacher to encourage such inclinations; the more interested he is in the welfare of his boys and girls, the more likely he may be to advise against teaching as a profession. This statement, however, is based on data collected in larger high schools only. It appears that in rural high schools the reverse is true; that in such schools there may be too much rather than too little encouragement to go into teaching. This matter appears to be related to the comparative social status of the teacher in city and country. The "social standing" of the high-school teacher improves as density of population diminishes.

Disillusionment of older city teachers.—As to city teachers, however, the sad fact is that the older and more experienced of

them are not much inclined to glory in their calling. They know more of the chill of satisfaction in duty done than they do of the warmth of creative effort. Too often their real selves have been sacrificed on the altar of administrative facility, and their ambitions assassinated by sheer weight of routine. They know how it feels to be a cog, and that is a terrible feeling for a teacher. So they become afflicted in private with a stifling sense of unfulfilment, a feeling that the social place and the salary accorded them do much to confirm. Such teachers may keep up the cheerful appearance of optimism about their work; they are afraid not to do so. But we can hardly expect them to carry this hypocrisy to the point of seeking proselytes for a profession in which they themselves have found little but mental and physical weariness.

Teachers with visions.—However, not all science teachers are like this, even in the larger systems. Some have a sincere faith and joy in their work that have persisted through many trying years. They see what the future is to bring of recognition and of better opportunity. In their vision science teaching may become most important of all efforts for social betterment. Somehow they see in it a striking at the very source of human errors. This is because they see in it more than the giving of knowledge for the sake of knowledge. They see in it a process of knowledge acquirement in such wise that the very foundations of wisdom are established thereby. They see the murkiness of this generation's visions, and by their teaching they seek to clarify the visions of the next. They are not concerned with the particular conclusions their pupils reach so much as they are concerned with the methods by which these conclusions are reached and with the attitudes attained toward problems in general. They feel that if the method is sound the conclusions will take care of themselves. To train, to stimulate, to rectify, and to develop this method is a principal part of their business. They have a confidence that veracity in mental processes is a teachable thing and, because science is peculiarly serviceable in such teaching, are devoted to it as a master workman is devoted to his tools. On this and on other grounds they are proud to maintain the high place of their profession among other professions, and they prove their sincerity by

devotion to it in the face of other offers. Such teachers do not hesitate to seek recruits; they do it for the recruit's sake as well as for the sake of the profession.

It is, to be sure, the very exceptional teacher of whom I have just written. Yet I have not written wholly at random, drawing an imaginative figure. I have written having in mind more than a score of teachers of my own close acquaintance, teachers of whom I consider these statements fairly descriptive, teachers whose work I have frequently observed, and with whom I have discussed precisely these matters. Very exceptional they are, of course, yet is not the teacher who is most significant for the future always the very exceptional teacher of today?

The need of suitable programs.—If, then, some teachers may with clear conscience send up to colleges and teachers' colleges each year a certain quota of young people seeking training for high-school science teaching, will these young people find programs suited to their needs? They will not. Collegiate programs are not usually arranged with view to such precocity in choice of teaching on the part of Freshmen.

In normal schools and teachers' colleges it is customary to arrange different courses for those who are to teach primary, intermediate, or grammar grades. A similar differentiation seems needed with reference to the training of high-school teachers of science. For high-school science, especially as junior high schools are established, is coming to be of two quite distinct kinds. There is one kind in Grades VII–X.[1] Then there is quite another kind in Grades XI and XII, and running on into the lower years of college. The former we designate *general elementary science;* the latter, *intermediate science.*

The line of demarkation.—The present tendency to organize school work on the basis of the six-three-three plan suggests that *general elementary science* should be planned for Grades VII–IX only. But we are not ready yet for such restriction. It is still a matter of years before high schools generally can build upon

[1] Reference to general elementary science as an affair of Grades VII-X does not imply a course continuous throughout those grades. It does imply the equivalent of two years of attention to the subject given somewhere in the four-year period indicated.

science work done in the seventh and eighth grades. Under these conditions we must ask for place in the tenth as well as in the ninth grade for general elementary science. As fast as this work becomes well established in VII and VIII, we will gladly withdraw claim for place in X. Meanwhile we must oppose the restriction of this work to one grade only. For to make "general science" a one-year subject only is, in the opinion of many, either to choke the life out of it, or to make it something quite other than science. So, under present circumstances, we treat of general elementary science as an affair of Grades VII–X, admitting VII–IX to be the desirable arrangement for the future. We regret the appearance of trying in this wise to force such a fluid thing as science teaching into what seem rigid categories of years and terms. The procedure is one against which every good science teacher instinctively rebels. Yet the necessity confronts us. If we are to have good science teaching in the schools we must first get adequate stage room and setting for it. What we are seeking is *opportunity* for good science teaching; we do not pretend for a moment that the opportunity is the thing itself, though our urgency in behalf of the opportunity may often give that impression.

Two kinds of high-school science.—General elementary science is intermediate in character between the nature-study which is below it and the more specialized science which is above it. It is largely nature-study as to its method of teaching, but it is science with respect to its organization. If it fails in being the latter, it ceases to be science, and becomes miscellaneous experience with things in which the pupil is supposed to be interested; it takes for its basis a psychology he has outgrown. If, on the other hand, it fails with respect to the nature-study or "project" method of teaching, and gives first place to logical organization merely for the sake of logical organization, then it has assumed a psychology of the pupil that he has not yet attained.

Intermediate science, on the other hand, so far as it is basically "pure science," rather than agriculture, domestic science, etc., is becoming increasingly similar to first science in college. It appears that one may regard the teaching of science to Freshmen

and Sophomores in college as much the same problem as the teaching of science to Juniors and Seniors in high schools. This being so, we have reason to hope that a real administrative equivalence may presently be recognized as between upper high-school science and junior-college science. This will mean, of course, a real articulation where now there is none, or very little—an articulation which may be based at first upon recognition of certain courses as given by certain teachers rather than upon recognition in this respect of a school as a whole.

The need for general training.—The existent arrangements do fairly well, if it were a question of training teachers to teach merely the special courses of the upper years. This is because the existent arrangements turn out specialists rather than generalists. But what is needed in addition is an opportunity to specialize in non-specialization. This thing university tradition is all against, and requirements for graduation effectually safeguard its accomplishment. Draw up, if you will, an outline for a four-year course of study designed to lead specifically to the teaching of science in Grades VII–X. Then look into university catalogues and find one whose present requirements (if taken seriously) permit granting a degree upon the completion of such a course. You may find that there is one, but I have not been able to do so. I do know of one normal college in which such a program may be taken and a degree achieved, but it is not a course which has been definitely organized.

An ideal course for such a candidate as we have in mind would be longer than four years. But four years is the limit of reasonable expectancy as to time he can afford for such training. Into that four years he must get his necessary professional training as well as his liberal culture. Let us note, however, that when such candidates begin to be recognized upon their arrival on the campus as well as upon their exit from it, the "administrative equivalence" of which we spoke a moment back will also have attained recognition. The candidate we have suggested has already shown a strong taste for natural science, and in his last two years of high school made high marks in year courses in physics, chemistry, botany, and zoölogy. The teachers of these courses have been

individually accredited by the institution our candidate enters. Hence, in lieu of his first college courses in science, he may increase his number of electives. So it should be noted in the suggestion of courses which follows that, though only one-fourth of the program is indicated as elective, this may be increased to as much as one-half by means of credit for upper high-school work. In the latter case, however, some more advanced science courses should be taken.

Details of a four-year program.—On the assumption that our candidate has already made up his mind to train for elementary science teaching, and can afford but four years in which to do it, we feel justified in placing early in his program a course on the aims and methods of elementary science teaching, accompanied by observations of such teaching. Such a course should enable him to profit by his "subject-matter" courses far more than he otherwise would. It will enable him to look at the subject-matter with discernment as to its values in connection with his own chief problem. It is assumed that such courses will necessarily be of the general type designed for the undifferentiated undergraduate. But he, being differentiated for teaching, needs to be in a position to judge for himself as to relative values. In such courses he is equipping himself with tools for his task; he needs to know how to choose the best ones, and not to burden himself with a miscellaneous kit. This does not mean that he will neglect part of his work at the expense of other parts; it chiefly means that he will realize far better the absolute importance of getting a clear and permanent grasp of the fundamentals.

Special provision should be made for his training in oral and written expression, preferably toward the end of his course, when he has more to express. The day may come when all high-school teachers will be such masters of English that masters of English as such will cease to exist; that English will be no longer taught as a separate subject, groping for its vague foundations, but will have real foundation and substance in the experiences in other courses. But whether our candidate will live to see that day or not, we should surely turn him out more skilled in expression and the teaching of it than most science teachers are.

Thus we come to a program somewhat like that in the accompanying table, which should be scanned only with the provision for additional electives in mind (see above).

	Quarter (12 Weeks) Units. All Five Times a Week	Semester Units	
		Number Semesters	Times a Week
First year—			
1. Aims and methods of elementary science teaching, with observations of teaching and drill on subject-matter	3	2	5
2. Geography	3	2	5
3. Social science	3	2	5
4. Electives	3	2	5
Second year—			
5. Social science, emphasis on education	3	2	5
6. Botany	3	2	5
7. Zoölogy	3	2	5
8. Electives	3	2	5
Third year—			
9. Physics	3	2	5
10. Chemistry	3	2	5
11. Education	2	2	3
12. Geology	2	2	3
13. Electives	3	2	5
Fourth year—			
14. Practice teaching	1*	1*	5
15. Expression	2	2	3
16. Astronomy	1	1	3
17. History of science	2	2	3
18. Philosophy and history of education	2	2	3
19. Electives	3	2	5

*Daily teaching for one quarter, or semester, with double credit.

Too diffuse? To be sure it is, as judged by the ordinary standards of undergraduate work, but not so perhaps if it is for one whose specific task is to be the teaching of science-in-general to boys and girls twelve to sixteen years old. A deliberate aim in planning such a program is to avoid specialization. Specialization, at this period, absolutely interferes with securing that breadth and balance of information whose lack is today perhaps the most serious handicap to good teaching of elementary science. Specialization is desirable once the broad foundation that we need so much has been secured, but first that foundation must be secured. Premature specialization interferes with it.

Administrative considerations.—Such a program needs analysis from the administrative standpoint. Only the larger universities and teachers' colleges are equipped to offer it, and then only as facilities for the practice teaching of high-school classes are adequate.

One teacher should be in charge of science as used in Grades VII to IX or X, and there his responsibility should cease. Restrict his work to this less differentiated region of science teaching that draws its materials without fear or favor from all the departments, and the sensitive question of trespass on the preserves of the academic departments may be settled. We assume that as to science taught before the pupil is sixteen, university departments of science will not file claims.

This director of elementary science will undertake synthesis of whatever science materials may seem desirable for the psychological situation of Grades VII to IX or X, and will demark himself quite clearly enough for administrative facility from what we may call "intermediate science." In the program outlined above he will teach courses 1 and 14, which come to ten teaching hours, his attention to 14 being continuous throughout the year, with different groups of students. He will also be the supervisor of elementary science in the practice school.

Intermediate science.—By intermediate science is meant the science of the upper years in high schools and of the lower years in college. Since these courses will increasingly become administrative equivalents, it is the teacher of the first course in a university department of science who should be in charge of the course in the method of teaching his subject in the upper years of high school. You note at once that no such course in special method appears in the program for a candidate for lower-science teaching. It should not, unless it be an elective. Of those who prepare to teach the special science of the upper years in the high schools, it is not too much to expect even now a year of graduate work. Such teaching will in the future more than now afford the chance of promotion into college teaching; and junior-college work will be multiplied by the growth of the larger high schools up into it. It is in his graduate year that such a candidate will take his courses in special method, and in his undergraduate work he may specialize more than the candidate for first science teaching. Preferably, however, he

will have been a teacher of elementary science before he begins his graduate training in special science.

A general principle.—The principle suggested in the forepart of the preceding paragraph may be stated as follows: ***Training in the method of high-school courses that approximate administrative equivalence with lower college courses should be given by the teachers of such equivalent college courses.*** It appears that adoption of this principle, in addition to the organization of a department of science instruction with specific reference to Grades VII to X, will secure greater economy and effectiveness than present arrangements, and with less rather than greater expense. It should be noted that such administrative practice would entail benefits both to college and to high-school courses. It would develop specialists of two kinds; they would divide a field in which specialization now suffers through being diffused over too large an area.

Such a plan would benefit the college courses as well as those of the high school. What expert teaching we now have in connection with elementary university science courses is more by chance than by plan. The few conspicuously good teachers of such courses are really more concerned with other matters. It is rare indeed to find a member of a university department whose first concern and pride is in the introductory courses. The tradition is that the teaching of such courses is a thing to be escaped as soon as possible, and promotion lies in the direction of emancipation therefrom into the purer air of lectureship to graduate students. But this is partly because the teaching of an introductory course does not take up enough of a man's time.

Finally it may be asserted that such an administrative adjustment would lead to a closer co-operation between university departments and departments of education than now exists. Such co-operation seems now to be a thing of theory rather than of practice. But the adjustment suggested compels partnership as to the intermediate science, a field in which the interests of education and of departmental science are so inextricable that the compulsion is justified.

THE EXPERIMENTAL DETERMINATION OF STANDARDS IN FIRST-YEAR ALGEBRA

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A report to the Mathematics Section of the Illinois High-School Conference of a preliminary investigation for the purpose of: (1) establishing certain methods by which standards for measuring the outcomes of a year's instruction in high-school algebra may be constructed; (2) stating tentative results obtained in eight Illinois high schools; (3) making certain criticisms of the learning and teaching process in algebra.

The conduct of this investigation is based upon the following statement of the ultimate aim of first-year algebra: The successful use of algebraic symbolism in meeting new problematic situations, either, (1) purely algebraic situations; (2) general mathematical situations (such as are found in other mathematics courses other than algebra); (3) non-symbolic situations including various types of "practical" or "applied" problems not expressed in mathematical language.

1. THE OUTCOMES OF FIRST-YEAR ALGEBRA

Believing that some statement of the assumed outcomes of first-year algebra should be made the basis for further analysis, the following tentative statement of these outcomes is made:

A. *Immediate, specific, and preparatory outcomes.*—These include the comprehension, interpretation, and manipulation of the specific "mechanical" operations involved in algebraic solutions; e.g., the four fundamentals as used with various type problems, factoring, removal of parentheses, etc. Certain of these are to be used in many specific algebra problems and in the solution of other mathematical problems; they are to be mastered as tools, preparatory to the taking of other mathematical courses, as well as for use as automatic tools for the solution of all types of "applied" problems. These involve primarily the learning of rules—the formation of specific habits of manipulation.

B. *Immediate generalized outcomes.*—These involve recourse to selective, analytic, and conceptualizing abilities; ability to apply principles, in addition to ability to remember rules and to make certain fundamental habitual adjustments in the solution of general practical and applied problems and in solution of problems belonging primarily to other mathematical fields.

C. *Remote and less tangible outcomes.*—The development of the ability to deal with general number concepts and "think quantitatively"; the development of attitudes of (1) orientation in algebraic or general mathematical fields containing problematic situations; (2) confidence in one's ability to use successfully algebraic symbols in meeting new situations; (3) a broadened intellectual background or perspective for the general cultural comprehension and interpretation of the scientific methods by which technical problems may be solved, i.e., the development of a "scientific attitude." (In the preliminary attack on the general problem of standards in this field it is not proposed to consider this third group of outcomes. We believe standards in first-year algebra should deal primarily with the "mechanical" processes—i.e., those which should be made automatic—and only very little with these other more indefinite ones.)

2. METHOD OF PROCEDURE

At the 1913 meeting of the Mathematics Section of the Illinois High-School Conference a committee was instructed to begin the study of establishing standards by which the results of one year's high-school algebra might be measured. The problem, as attacked by the chairman of that committee (Mr. R. L. Modesitt of the Eastern Illinois Normal School), consisted of an attempt to determine the relative degree of difficulty inhering in a set of "mixed" algebra problems (i.e., a list containing both "mechanical" and "applied" problems), as shown by the varying proportions of a group of fifty pupils who were asked to solve the problems. This attempt, resulting in an adaptation of Thorndike's "mixed scale" (discussed below), was to be extended during the past school year. Other duties compelling Mr. Modesitt to give up the work, the conduct of the investigation was turned over to the present writer. Mr. E. L. Mayo kindly consented to assist in the work but has been

prevented from much active co-operation by unexpected and uncontrollable circumstances arising in connection with the administration of the classes in his school. He and his colleagues have helped, however, by giving the Thorndike tests in their classes. Thus the writer is alone responsible for the assumptions, line of attack, and present analysis and conclusions from the data.

It should be emphasized in starting that we regard this investigation to date as of a preliminary nature only and not as one which has enabled us to state definite and final standards. The problem being turned over to the writer so late in the year caused the collection of data and organization of the work to be somewhat hurried. The material presented in this report is therefore more open to criticism of the "conditions" under which the data were secured than will be the case in the extension of the investigation during the coming year. We consider, however, that a sound beginning has been made on a very complex problem, the conclusion of which can come only in the course of years of careful and co-operative experimentation.

The procedure since April, 1915, may be outlined as follows:

1. Preliminary statement of the aims and the outcomes of the teaching of high-school algebra.

2. Determination of basic method of designing and constructing tests for measuring efficiency in first-year algebra. (The investigation of the validity of the assumptions underlying Thorndike's "mixed" scale, concerning (*a*) the relative difficulty of problems and (*b*) the validity of testing pupils with a scale composed of both "mechanical" and applied problems.)

3. Classification of the subject-matter of first-year algebra and the determination of a list of specific operations whose efficiency should be tested.

4. Determination of principles which should govern the selection of test problems.

5. Selection of problems composing each test with preliminary individual experimentation to standardize the arrangement and timing of these problems.

6. Final organization of test sheets and giving of tests in eight school systems in Illinois according to standard directions.

7. The correction of the test papers; original tabulation of scores obtained; statistical treatment of results to state typical conditions; a minute analysis of the specific errors made in each problem.

8. The interpretation of tabular and statistical material and conclusions concerning the progress of the experiment to date.

3. GENERAL CLASSIFICATION OF SUBJECT-MATTER AND LIST OF SPECIFIC OPERATIONS TO BE MASTERED

The subject-matter in first-year algebra is first roughly classified to fit the assumed outcomes as follows:

A. *All material of a mechanical nature*, necessitating complete automatism—the establishment of definite groups of habits through continued drill. The writer assumes that the following list of operations should be absolutely mastered as a result of the drill given in first-year algebra (there is stated in parentheses after each point the number of the test in which the efficiency of this operation is measured):

1. Addition and subtraction of positive and negative numbers.
2. Law of signs in multiplication (Tests 1 and 2).
3. Law of signs in division (omitted in design of tests).
4. Addition and subtraction of monomials (Test 2; Test B–3).
5. Addition of polynomials (omitted in design of tests).
6. Removal of parentheses (Tests 1 and 2).
7. Multiplication of monomials (Tests 1 and 2; Test B–17).
8. Multiplication of polynomials (Tests 1 and 2).
9. Multiplication of monomials by monomials, polynomials by polynomials, and monomials by polynomials (Tests 1 and 2).
10. Division of monomials, reduction of quotients (Test 3, problems 7, 14, 21, 28).
11. Use of exponents (Test 3).
    a) without parentheses:
    A. Multiplication of monomials involving
        1) integral numerical exponents (problems 1, 3, 8, 10, 15, 16, 17, 19, 22, 23, 24).
    b) with parentheses (problems 4, 11, 18, 25, 27).
    c) negative integral exponents (problems 5 and 12).
        2) literal exponents (problems 2, 9, 16, 17).
        3) fractional exponents (problems 6, 13, 20, 26).
    B. Division of monomials involving exponents (problems 7, 14, 21, 28).

12. Division of polynomials (omitted in design of tests).
13. Squaring binomials (omitted in design of tests).
14. Substitution (Test 5; Test B, problems 1 and 18).
15. Factoring monomials (Test 4, problems 2, 7, 12, 17, 22).
16. Factoring of difference of two squares (Test 4, problems 1, 6, 11, 16, 21).
17. Factoring trinomial squares (Test 4, problems, 4, 9, 14, 19, 24).
18. Factoring trinomials of form ax^2+bx+c (Test 8, problems 3, 8, 12, 16, 20).
19. Solution of equations of first degree with one unknown (Test 6; Test B–14).
20. Solution of fractional equations (Test 7).
21. Solution of quadratic equations (Test 8).

B. *All material of an original nature* which, though necessitating constant use of definitely learned systems of habits, primarily involves independent thinking in applying fixed methods to new problematic situations:

1. Applied problems leading to equations of first degree with one unknown (Test B, problems 4, 5, 9, 10, 11, 12, 16, 19, 21, 23, 25).
2. Applied problems involving ratio and proportion (Test B, problems 8, 13, 15, 22).
3. Applied motion problems (Test B, problems 16 and 17).
4. Applied problems involving translation of verbal expression into algebraic symbolism (nearly all of problems in Test B).

It should be emphasized again that our attention has been centered primarily on the organization of the automatic operations and that the list given here of the types of verbal problems is by no means considered exhaustive. Furthermore in connection with such topics as: the graph and its application, the formula, solution of equations in two unknowns, groups of three or more linear equations, etc., we are far from a final decision as to their place in the course of study. It will be the aim of next year's study to establish a standard in this field.

4. THE DETERMINATION OF A VALID METHOD FOR MEASURING EFFICIENCY IN THE LISTED OPERATIONS AND TYPES OF PROBLEMS

The design of tests to measure efficiency in algebra implies a definite and detailed analysis of the specific operations and processes to be mastered in the study of the subject. The design to be outlined here is based on the analysis made above.

A. *Types of design.*—There are at least three types of design.

Type I. The Mixed Scale: Professor E. L. Thorndike assumes that one mixed test, containing "mechanical" problems of many types and "original" problems involving many sorts of fundamental operations, will be a valid measure of efficiency in elementary algebra.

Type II: On the other hand, the opposite extreme view concerning algebra tests would have each specific operation tested separately; i.e., such elemental processes as addition of monomials and polynomials and the other fundamentals would be measured by separate tests.

Type III: Between these two extremes it is possible to occupy a middle ground, by building a test-system which will test the larger and more important operations in a reasonably detailed manner, at the same time combining certain of the most elemental operations in one test. The first type of design obviously cannot measure in any valid way many of the more important outcomes of the study of algebra. The second method, if carried to its logical extreme, would build up a test-system so detailed and cumbersome that no school system could hope to use it in the periodic determination of pupil efficiency. Granted that the ideal "measuring-stick" would measure specifically every operation used in algebraic solution, classroom and administrative requirements would prohibit its use. To get a usable measure, therefore, we must compromise in our desire for detailed analysis. The writer has imposed the criterion that the giving of the completed algebra standards to any class shall occupy not more than two or three class periods of 45 minutes each.

B. *Fundamental criteria for the design of an algebra scale.*—To measure algebraic abilities we must have a basis for determining the *relative difficulty* of problems and tests. There are four possible criteria: (I) the teacher-judgment basis; (II) "proportion-of-pupils-solving" basis; (III) the quantitative enumeration and objective analysis of the steps and operations involved in various types of problems; (IV) the solution of all types of tests by individuals under carefully controlled conditions (i.e., individual laboratory tests) with detailed individual discussion and comments on particular problems and difficulties. The teacher-judgment

method assumes that the relative difficulty of algebraic problems and processes can be determined by the uncontrolled judgment of teachers of algebra. The second method assumes that the relative difficulty of problems will vary directly with the proportion of a large number of pupils able to solve the problems in question correctly.

I. The Teacher-Judgment Basis: Implicit in the design of all of Professor E. L. Thorndike's "scales" (handwriting, drawing, composition, and algebra) is the assumption that "relative difficulty" or "relative merit" will vary as the proportion of "expert" judges varies who rank certain samples of student work as better or poorer than other samples. In order to apply the method to algebra he submitted 25 problems of various types (printed herewith in the order of their final ranking) to 200 teachers of algebra, asking them to "rank" the problems in order of difficulty. From the returns he selected a "scale" of nine problems, some of the automatic type and some of the applied type, some simple and some very complex, by taking the problems D, K, A, T, H, E, I, V, W, which an approximately equal percentage of his group of judges had ranked as of successively greater degree of difficulty. That is, approximately 80 per cent of 200 judges rank K more difficult than D; A more difficult than K, etc., throughout the list. Thorndike's deduction is, after some statistical manipulation, that the interval of difficulty between each two consecutive problems, D, K, A, etc., is equal and that these problems taken together represent a scale by which we may measure the efficiency of 20 weeks' instruction in elementary algebra. (It should be said that Professor Thorndike states that a better scale could be designed by using other methods. We are criticizing here Thorndike's acceptance and continued use of this method, *not* his failure to recognize the greater validity of other methods.)

LIST OF PROBLEMS USED BY PROFESSOR THORNDIKE IN DESIGNING ALGEBRA SCALE

We state with each problem the percentage of pupils who solved the problem correctly

(97.6) D. If $a=4$ and $b=2$ what does $a+b$ equal? Answer.....
(97.0) K. If $a=4$ and $b=0$ what does $a+b$ equal? Answer.....
(91.7) A. If $x+3a=5a$ what does x equal? Answer.....

(87.0) L. If $3x+4=2x+8$ what does x equal? Answer.....

(64.5) O. If $a=3$ and $b=2$ what does a^2-ab equal? Answer.....

(62.8) S. If $a=6$ and $b=1$ what does $2ab-ab^2$ equal? Answer.....

(36.1) T. Find the average midnight temperature for the week in which the daily midnight temperatures were 15, 3, 0, −7, −9, 6, and 17 degrees. Answer .....

(53.2) P. If $x-2a+b=2x+2b-4a$ what does x equal? Answer.....

(61.0) U. If $\frac{x}{a+b}=a-b$ what does x equal? Answer.....

(34.3) G. If $a=6$ and $b=3$ what does $\sqrt{a}\sqrt{2b}$ equal? Answer.....

(53.9) B. The circumference of a circle$=2\pi r$. $\pi=3\frac{1}{7}$. $r=$the length of the radius of the circle in question. If the diameter of a bicycle wheel is 28 inches, how many inches is the circumference? Answer .....

(19.0) C. If $\frac{6x+7}{5}-\frac{2x-1}{10}=4\frac{1}{2}$ what does x equal? Answer.....

(62.8) Q. If $\frac{4}{x+2}+\frac{7}{x+3}=\frac{37}{x^2+5x+6}$ what does x equal? Answer.....

(17.9) H. If $\frac{1}{a}-\frac{1}{x}=\frac{1}{x}-\frac{1}{b}$ what does x equal? Answer.....

(8.3) E. If $2+\frac{\frac{x}{a}-1}{\frac{2}{a}}=0$ what does x equal? Answer.....

(0.0) I. A man has a hours to spend riding with a friend. How far can they ride together, going out at the rate of b miles an hour and just covering the return trip at the rate of c miles an hour? Answer .....

(3.5) R. Let e stand for the safe load that can be hoisted by a hemp rope. Let c stand for the circumference of a rope. If $l=100\ c^2$ for any hemp rope, how many pounds are a safe load for a hemp rope $2\frac{1}{2}$ inches in circumference? Answer.....

M. If $\frac{x+a}{x-a}-\frac{x-a}{x+a}-\frac{x^2}{a^2-x^2}=1$ what does x equal? Answer.....

X. At what time between 6 and 6:30 o'clock are the hands of a watch at right angles to each other? Answer.....

Y. If $x=\frac{a+b}{2}$ what does $\left(\frac{x-a}{x-b}\right)^3-\frac{x-2a+b}{x+a-2b}$ equal? Answer.....

J. If $\frac{a+b}{b+c}=\frac{c+d}{d+a}$ prove that $a=c$, or that $a+b+c+d=0$.

N. There are two thermometers or scales to measure temperature. The Fahrenheit scale (F.) is the one we commonly use. The other is called the Centigrade scale (C.). A temperature of 32 degrees on the F. scale=0 degrees on the C. scale; 33.8 degrees on the F. scale=1 degree on the C. scale; 35.6 degrees on F.=2 degrees on C.; 50 degrees on F.=10 degrees on C.; 14 degrees on F.=−10 degrees on C.

a) What on the C. scale=70 on the F. scale? Answer.....

b) What on the C. scale=4 degrees *below* zero on the F. scale? Answer.....

c) What on the F. scale=20 degrees on the C. scale? Answer.....

V. How much water must be added to a pint of "alcohol, 95 per cent pure" to make a solution of "alcohol, 40 per cent pure"? Answer.....

F. A cube containing eight cubic inches was plated with copper. The difference in the weights of the cube before and after the plating was 0.139 lb. One cubic inch of copper weighs 0.315 lb. Form an equation from which the approximate thickness of the copper plating could be calculated. State whether the approximate estimated thickness by your equation would be less or more than the exact thickness.

W. Given that $2x-3$ is less than $x+5$ and that $11+2x$ is less than $3x+5$, to find the limits (i.e., the values) between which x lies.

(It is understood that the pupil has not had any special training in inequalities or limits. This problem is, so to speak, an original exercise.)

II. The Proportion-of-Pupils-Solving Basis: The foregoing basis (I) being open to criticism on analytical and psychological grounds, the writer reports herewith a slight beginning that he has made in investigating the validity of the method. The progress made has consisted of a comparison of Thorndike's results with those obtained by having students solve the same list of problems. His list of problems has been worked by 169 students in the Joliet Township High School, 92 of whom had just finished first-year algebra, 58 of whom had finished it one year before taking the tests, and 19 of whom had studied it two or more years before. The problems were arranged on the sheet in the exact order of difficulty as determined by Thorndike's rank method, giving what little influence the time element might exert to the support of his ranking. Table I below summarizes the number and percentage of this group

TABLE I

PERCENTAGE OF 169 HIGH-SCHOOL PUPILS SOLVING CORRECTLY THE FIRST 19 OF THORNDIKE'S TEST PROBLEMS

Problems are lettered

	Problems	D	K	A	L	O	S	T	P	U	G	B	C	Q	H	E	I	R	M	X
Number	92 pupils	89	87	85	82	57	49	39	56	61	34	47	12	66	22	11	0	2	0	0
	58 pupils	57	58	54	51	40	24	17	27	34	17	31	15	36	6	3	0	2	0	0
	19 pupils	19	19	16	14	12	5	6	7	8	7	13	5	4	2	0	0	2	0	0
	Total, 169 pupils	165	164	155	147	109	78	62	90	103	58	91	32	106	30	14	0	6	0	0
Percentage	92 pupils	96.7	94.6	92.4	89.2	61.9	53.3	42.4	60.9	66.3	37.0	51.1	13.0	71.8	24.0	12.0	0	2.3	0	0
	58 pupils	98.3	100	93.1	88.0	70.0	41.4	30.0	46.6	58.6	30.0	53.4	25.9	62.1	10.4	5.2	0	4.0	0	0
	Total, 169 pupils	97.6	97.0	91.7	87.0	64.5	46.1	36.7	53.2	61.0	34.3	53.9	19.0	62.8	17.8	8.3	0	3.5	0	0

of students who solved each of the first 19 problems correctly. (They were given one class period of 45 minutes to solve the entire list of 25 problems. All attempted to solve more than the first 19 and it is assumed here that the pupils had sufficient time to satisfy themselves that they could or could not work these 19 problems. That is, we believe that the element of "pressure" or "drive" due to the "time" factor does not operate here.)

What does the tabulation in Table I show? It shows that, instead of being solved successfully by gradually decreasing groups of pupils, the problems fall into a few sharply differentiated groups. Problems D, K, A, L, (Group A) can be solved by nine-tenths or more of the pupils who have had one year's algebra instruction; problems O, U, Q and possibly P and B seem to be about equally difficult, in general being solved by about two-thirds as many pupils as the problems of the first group; T and G are in another class of "difficulty" and C and H are in still another; E, I, R, M, X are again in a class by themselves, being so difficult to solve that practically no pupils can work them. Our tabulation confirms Thorndike only in the fact that the *order* of problems is the same, the interval of difficulty being decidedly unlike as determined by the two methods. To bring out this point more clearly note the size of the "interval of difficulty" between the seven problems on his scale and that determined approximately by the other basis.

TABLE II

COMPARISON OF RELATIVE DIFFERENCE IN DIFFICULTY BY TWO METHODS

Relative Difference in Difficulty (Thorndike)	Problems	Percentage of Group Solving	Approximate Relative Difference of Difficulty Based on Proportion of Pupils Solving
1 diff.	D	97.6	1 diff.
2 "	K	97.0	1 "
3 "	A	91.7	2 "
4 "	T	36.1	7 "
5 "	H	17.9	9 "
6 "	E	8.3	10 "
7 "	I	0.0	11 "

One outstanding fact appears: The judgment of teachers cannot be taken as a safe criterion for estimating the relative frequency

with which pupils can be expected to solve various types of problems. The writer would go further and say that the judgments of teachers cannot be taken as a safe criterion in determining the relative difficulty of algebra problems, and that of the two methods thus far discussed the "proportion-of-pupils-solving" method is the more valid. Any method of determining difficulty of problem solution must be based on a sound and minute analysis of subject-matter and of the psychological processes involved in the solution. A most elementary analysis would reveal at once the distinction in difficulty-to-the-student, between the large group of "mechanical" operations which have been made more or less automatic by drill and the group of applied or original problems in which little or no drill has been given. That this analysis is necessary is shown by our tabulation, viz.: Practically all pupils can solve the simple automatic operations of substitution when expressed in "drill" form as in problems D, K, A; practically no pupils can use exactly the same processes when expressed in "original" form as in R. Approximately half of the students can solve fairly complex equations of the first or second degree in one unknown when expressed in familiar "drill" form; practically no pupils can successfully use the same processes when needed in original or applied problems.

III. Quantitative Analysis of Operations Involved in Problems: As a further check on these two methods let us bring the third method of determining "relative difficulty" into review: namely, that of making a minute quantitative analysis of the problems in question. This would consist of an enumeration of the like and unlike steps to be carried out by the pupil. To illustrate with the foregoing problems, we arrange the data as in Table III.

The most casual inspection of the data in Table III is enough to lead to the conclusion that the relative difficulty of algebra problems to pupils cannot be determined by a mere quantitative enumeration of the number of like and unlike processes which the pupil must successfully handle. Problem R, a simple substitution problem, involving direct substitution of two quantities and one multiplication, is beyond the abilities of 96.5 per cent of these 169 pupils (presumably a normal group), while Q, a fractional equation including 1 factoring of a trinomial square, 5 multiplica-

tions, 2 additions, 1 subtraction, 1 transposition, 1 changing of sign (11 operations in all), is solved successfully by two-thirds of the group. Clearly "difficulty" is not to be determined in terms of number of operations involved.

TABLE III

Problem	Process	Number of Steps	Substitutions	Total Steps	Percentage of Pupils Solving
D	Addition	1	2	3	67.6
K	Addition	1	2	3	97.0
A	Change signs Transposition	1 1	1	3	91.7
L	Transposition Change signs	2 2	2	6	87.0
O	Squaring Multiplication Subtraction	1 1 1		3	64.5
S	Subtraction Squaring Multiplication	1 1 3	4	9	46.1
T	Addition Division	7 1		8	36.1
P	Transposition Change signs Subtraction	3 3 3		9	53.2
U	Recognition of squaring Multiplication Addition	2 4 1		7	61.0
G	Square root Multiplication	2 1	2	5	34.2
Q	Factoring trinomial square Multiplication Adding like terms Transposition Change signs Subtraction	1 5 2 1 1 1		11	62.8
R	Squaring Multiplication	1 1	2	4	3.5

Thus we repeat, teacher-judgment of the relative difficulty of problems, even when aided by quantitative enumerations of like

and unlike processes, cannot be regarded as valid for the construction of "problem-scales" of definitely evaluated units of difficulty. (From a detailed investigation of the problem in freehand lettering, the writer is also able to state that the teacher-judgment method of determining "merit" in samples of student work—unaided by an objective standard—is to be called into question. This leads him to suspect that results obtained by the methods in drawing and in composition will lead to the same unbalanced results as in algebra.) Obviously we have no satisfactory evidence that the seven problems of Thorndike's scale are separated by equal intervals of difficulty. In fact, from the point of view of the pupil who has to solve the problems, we know that they are not.

This question of the evaluation of the bases upon which educational standards are to be built is fundamental to the whole measuring movement. Many scales have been and are being constructed on the teacher-judgment basis in drawing, composition, handwriting, algebra, and the sciences and applied sciences. Such a slight beginning as we have reported above indicates that the method is questionable. It is recognized that our data are somewhat meager —that a larger group must be used and a much more detailed analysis must be made. The writer is now carrying on an investigation of this question of "bases" as applied to various scales and will report results later. In the meantime we have cleared the way for the organization of our own procedure in establishing standards in algebra. It will be assumed in this preliminary investigation that practicable standard tests can be built on the hypothesis that, in a large group of pupils, relative difficulty will be approximately indicated by the relative proportion of pupils correctly solving the test problems. At the same time it is specifically recognized that the final standardizing of algebra tests must include detailed consideration of a much more complete analysis. This leads us to speak briefly of the fourth method of evaluating "difficulty" in algebra problems, namely:

IV. The Qualitative Psychological Analysis of Problem Solution in connection with carefully controlled tests of individuals and complete introspective and interpretive data by the pupil. As a result of the first seven months of investigation of this problem the writer is convinced that no final standards can be determined

without a thorough utilization of this method. The learning process must be studied both objectively and introspectively with the individual student to reinforce and clarify the data secured from class testing. This latter may result in definite objective standards of the average number of problems "attempted" and "right" in a given unit of time for each specific test given. It will enable the teacher and superintendent to measure their school or system against the norm of many others. But it alone cannot be the sole criterion for the design and construction of the tests themselves.

5. PRINCIPLES GOVERNING THE SELECTION OF TEST PROBLEMS AND CONDUCT OF TESTS

In order that a scale for measuring efficiency in elementary algebra may successfully test automatic efficiency and independent solution it must be composed of two general types of test: (1) a specific test series (A) which will test the specific manipulative abilities of students in all the basic automatic operations involved in the solution of algebra problems; (2) a composite test (B) which will test the independent ability of the student in practical or applied problems.

1. *The Specific Test Series A*, as designed and presented herewith, conforms to the following requirements:

a) It is made up of a series of problem tests each of which is designed as a specific test for a definite automatic operation in algebra solution.

b) Each specific test is made up of a number of problems (10 to 28) each of an elemental nature and involving the operation in question, and each of approximately the same degree of difficulty (estimated here of course).

c) Where it was impossible to arrange separate tests for all kinds of operations involved (owing to lack of time in classroom handling, etc.), those problems which involved closely related operations were grouped in one test and arranged in rotation. Thus the student solving 20 problems may be compared with the one solving 10 problems.

d) Each test was designed as a time test, the time being so arranged (estimated) that no student could quite finish the test in the time given, but so that all could do a considerable number—

otherwise the measure of efficiency would have been too coarse. Care was taken to see that all pupils started and stopped the test at the same instant.

e) The directions were all given orally by the experimenters so that differences in rate of reading and comprehending directions might not complicate results.

f) Test problems were of the alternative sort wherever possible; i.e., they were designed to give either right or wrong answers—otherwise careful evaluation and weighing of answers would have been necessary.

2. *The Composite Test B.*—An ideally designed composite test would be composed of many (say 25) "applied" algebraic problems varying in difficulty by approximately equal intervals and covering all the fundamental types of operations involved in algebraic solution. These problems should not include any of the specific problems of the first test series (A); they should be confined to the abilities of generalization, analysis, and application. Application of the rules and operations for which Test A is the immediate test is the primary function of the composite test. As indicated above, since we cannot use the teacher-judgment method or the quantitative enumeration of operations in this preliminary construction of the composite test, we are forced to the trial-and-error method of selecting a priori what seems to be a representative list of applied problems. The primary purpose of this study has been the standardization of Test Series A and what has been done on Test Series B is of the nature only of a trial-and-error attempt to define the problem and a sound method of approach.

On a basis of the foregoing principles Test Series A (8 specific tests) and Test Series B (composed of 25 applied problems) were constructed. We print below the first few problems of each "specific" test and Test B complete.

THE FIRST SIX PROBLEMS OF THE EIGHT TESTS IN SERIES A

Test I	Test II	Test III
(1) $5(4x-2)=$	(1) $3x+(x+1)=$	(1) $a^3 \cdot a^5=$
(2) $-4(3x-4)=$	(2) $4x+(x-2)=$	(2) $a^x \cdot a^y=$
(3) $-7(2+5x)=$	(3) $n-(-7n+4)n=$	(3) $5a^7 \cdot 6a^5=$
(4) $-3(5-8x)=$	(4) $2y-(y+3)=$	(4) $(n^2)^2=$
(5) $6(-3x-5)=$	(5) $5z-(z-5)=$	(5) $x^{-1}x^1=$
(6) $-8(-4x-7)=$	(6) $3y(y-5)-y^2=$	(6) $(a^6)^{\frac{1}{3}}=$

Test IV. Factoring

(1) x^2-64 =
(2) $5x^2+15x=$
(3) $ax^2+bx^2+ay^2+by^2=$
(4) $x^2+4x+4=$
(5) $(x+6)^2-9=$
(6) x^2-16 =

Test V

(1) If $a=3$ and $b=2$ what does a^2-3ab equal?
(2) If $c=6$ and $d=1$ what does $2cd-cd^2$ equal?
(3) If $a=4$ and $b=3$ what does a^2-ab^2 equal?
(4) If $e=5$ and $f=4$ what does $ef-2ef^2$ equal?
(5) If $a=3$ and $b=4$ what does $ab-2ab^2$ equal?
(6) If $x=4$ and $y=6$ what does $2x^2+xy$ equal?

Test VI. Solve for x

(1) $-13x=7$
(2) $4x+3=9x-6$
(3) $7x-5+2x=13$
(4) $4+5(x-3)=6$
(5) $18x=-31$
(6) $x-4=-8x+14$

Test VII. Solve for x
Leave answer in form of fraction

(1) $\frac{4x-2}{3}=\frac{x-3}{4}$

(2) $\frac{-6(2x-8)}{5}+\frac{-3(2x+5)}{4}=\frac{2x+4}{10}$

(3) $\frac{x+1}{x-1}=\frac{5}{3}$

(4) $6x-5-\frac{(6x+11)}{4}=13x$

(5) $\frac{3x-4}{6}=\frac{x+2}{4}$

(6) $\frac{5(x-7)}{7}-\frac{4(3x+6)}{4}=\frac{-4(x-3)}{14}$

Test VIII. Solve for x

(1) $x^2-81=0$
(2) $x(x-2)=0$
(3) $x^2+px=6p^2$
(4) $x^2-7x=-12$
(5) $x^2-121=0$
(6) $x(x+7)=0$

ALGEBRA TEST B

1. If a boy is x years old, how old will he be in 5 years? Answer.....
2. An aeroplane that can fly 58.2 miles an hour in still air is retarded by a wind 9.7 miles an hour. At what rate does the aeroplane fly? Answer.....
3. If you represent a number by x, how will you represent 5 more than 4 times the number? Answer.....
4. Four increased by three times a certain number equals nineteen. Find the number. Answer .....
5. Four years ago a man was seven times as old as his son and his son is now eight years old. Find the age of the father. Answer.....
6. A train leaves Pittsburgh for the West at the same time that one leaves for the East. The former travels at the average rate of 42 miles an hour and the latter at the rate of 38 miles an hour. In how many hours will they be 240 miles apart? Answer.....

7. Which increases more rapidly when r increases, the area of a circle or the circumference? Answer.....Why?.....
8. A line 21 inches long on a certain map corresponds to 22 miles. A line $7\frac{1}{2}$ inches long corresponds to how many miles? Answer.....
9. Eight times a certain number equals 45 diminished by the number. Find the number. Answer.....
10. A father is 23 years older than his son and the sum of their ages is 49 years. How old is each? Answer. Father is.....Son is.....
11. The perimeter of a rectangle is 256 feet. It is three times as long as it is wide. Find its dimensions. Answer.....
12. A can do a piece of work in 3 days and B in 4 days. In how many days can both do it working together? Answer.....
13. State whether the quantities mentioned below are directly or inversely proportional:
    a) The number of yards of a certain kind of silk and the total cost. Answer.
    b) Time a train needs to travel 10 miles and speed of train. Answer....
    c) Length of a rectangle of constant width and area of rectangle. Answer.....
    d) Distance traveled by train moving at uniform rate and the time. Answer.....
14. Given the formula $a=\frac{1}{2}h(b-b')$, find the formula for b'. Evaluate the result for $a=40$; $h=8$; $b=6$. Answer.....
15. If a boy $4\frac{3}{4}$ feet tall casts a shadow $4\frac{1}{2}$ feet long at the same time that a school building casts a shadow $67\frac{1}{2}$ feet long, how high is the school building? Answer.....
16. Find two consecutive numbers whose sum is 157. Answer.....
17. If a train moves at the rate of r miles an hour how far will it move in t hours? Answer.....
18. The circumference of a circle is given by $2\pi r$; π is $3\frac{1}{7}$ and r is the radius of the circle. If the diameter of a bicycle wheel is 20 inches how many inches in the circumference? Answer.....
19. A post is $\frac{1}{5}$ of its length in the ground, $\frac{1}{2}$ of its length in water, and 9 feet above water. Find its length. Answer.....
20. Find three consecutive numbers whose sum is 63. Answer.....
21. A rectangular field is 10 yards wide and another is 12 yards wide. The second is 5 yards longer than the first and the sum of their areas is equal to 390 square yards. Find the length of each. Answer.....
22. If a boy lying down, with his eye on the ground, sights over the top of a 10-foot pole, held vertically $6\frac{1}{4}$ feet from his eye, and can just see over the top of a tree $37\frac{1}{2}$ feet from his eye, how high is the tree? Answer.....
23. A cistern can be filled with two pipes in m and n minutes respectively. In how many minutes can it be filled by the pipes together? Answer....
24. The areas of two circles are proportional to the squares of their radii. If the radii of the two circles are to each other as 4:7 and the area of the smaller circle is 8 square inches, what is the area of the larger? Answer..

25. Find the number whose third and fourth parts added together make 14. Answer .....

The following teachers kindly co-operated in the investigation by giving two class exercises to the work of testing their pupils and conducting the tests as a regular part of their school work according to our detailed directions: Miss Jessie Brackensiek, Quincy, Ill.; Dr. E. H. Taylor and his teachers of mathematics in the State Normal School, Charleston, Ill.; Mr. Ward Taylor and his teachers of mathematics in the State Normal School, Carbondale, Ill.; Miss Lida C. Martin and Mrs. Hostetler, Decatur, Ill.; Miss Fannie Andrews, Marshall, Ill.; Mr. R. M. Ginnings, Macomb, Ill.; Mr. O. R. Hedden, Robinson, Ill.; Mr. E. L. Moyer, Chicago Heights, Ill. Our thanks are due to these teachers for their co-operation. It should be stated that at least fifteen teachers in other systems expressed their hearty interest in the problem but were prevented from co-operating only by the fact that their final examinations for the year were then being held. The reorganization of our investigation, coming as it did in the spring, necessitated this late request for assistance—otherwise a much larger amount of data would have been gathered. We have had, however, all the data that there was time to consider and more would have delayed the sending out of this report.

Complete tests were taken by 518 pupils who were just finishing first-year algebra, giving us something over 4,500 test sheets in all. The treatment of these data may be outlined as follows:

(1) Original tabulations: The tests were next corrected and tabulated in terms of the number of problems "attempted" and "right" for each pupil.

(2) The average number of problems attempted and worked correctly in each test for each school, in one minute, and the averages for the entire group of pupils were next computed, *by finding the harmonic mean.*[1] For purposes of this preliminary

[1] In this connection the reader's attention is called to the fact that in averaging data involving "time rates" it is necessary to use the *harmonic mean*, which is the arithmetic mean of the sum of the reciprocals of all the numbers. A statistical fallacy common to educational investigations involving time rates (e.g., see Starch, *The Measurement of Efficiency in Reading, Writing, and Spelling*, Madison, Wis., 1915) is to average such rates by the arithmetic mean. This practice invariably gives a

investigation these averages may be regarded as tentative standards against which to check the efficiency of the teaching process in any school.

(3) The rank of each school was next computed for each test and the average rank of each school in all tests combined.

(4) The relationship existing between the abilities involved in the different tests was computed by the Pearson product-moment method.

(5) The percentage of problems attempted which were worked correctly in each test, i.e., the relationship between speed and accuracy in various types of test, was worked out.

(6) The tabulation of particular problems correct in each test and a study of the validity of the method of constructing Test A was next taken up.

(7) A detailed tabulation of the particular errors made by each of 100 pupils (selected at random) in each test.

(8) A program of procedure for the continuation of the study.

In order to accommodate the data of this study to the space of a magazine article they will be presented in tabular form with brief interpretation and discussion of each table.

Table IV presents the typical features of our data for eight school systems. These data provide us with tentative standards only concerning the number of problems (consisting of definite types of operations) which should be worked in a given unit of time. Given a large and representative sampling of schools, we shall be able to refine our standard tests and their applicability to practical school measurement. For the time being the primary value of our results lies in the fact that they provide the basis for a critical revision of our tests, indicate the general line of approach in this problem of test construction, and lay bare certain weaknesses in the standardizing of the "teaching emphasis." These problems are fundamental, for the question of principles-of-design and

result deviating from the true mean by as much as 15 per cent. The use of the arithmetic mean in averaging the time rates of this investigation results in an error exceeding that amount. Proof and illustrations of the effect of using the two means will be ound in the first of a series of discussions of "Statistical Fallacies in Educational Research," shortly to be published elsewhere by the present writer.

methods-of-construction must soon be worked out to a satisfactory conclusion.

TABLE IV

THE AVERAGE NUMBER OF PROBLEMS PER MINUTE "ATTEMPTED" AND "RIGHT" FOR EACH OF EIGHT SCHOOLS AND FOR ENTIRE GROUP OF 518 PUPILS

Tests ...	I		II		III		IV		V		VI		VII		VIII		No. MINUTES PER PROBLEM TEST B	
School ..	Att.	Rt.	Att.	Rt.	Att.	Rt.	Att.	Rt.	Att.	Rt.	Att.	Rt.	Att.	Rt.	Att.	Rt.	Att.	Rt.
A	8.34	6.60	3.45	1.38	7.50	4.30	2.17	1.38	2.17	1.27	2.85	1.04	0.69	0.17	0.76	0.37	2.45	3.63
B	7.95	5.35	3.25	1.08	7.19	4.00	2.70	1.60	2.56	1.08	2.30	0.92	.57	.19	1.38	.65	4.00	6.20
C	10.06	8.00	3.37	1.15	8.57	4.73	1.57	0.79	2.71	0.98	1.68	0.63	.56	.17	1.23	.33	2.65	4.65
D	8.39	7.89	3.41	0.79	5.00	2.30	2.24	0.84	2.38	1.04	1.60	0.97	.95	.26	1.25	.58	....	....
E	9.37	9.16	4.37	2.11	4.95	3.05	1.85	1.08	2.44	1.31	2.70	1.28	.58	.22	0.87	.41	2.50	3.65
F	9.91	8.36	4.48	2.05	7.45	3.85	2.70	2.25	2.80	1.63	3.17	1.38	.83	.26	1.45	.54	2.97	4.36
G	6.54	4.45	4.41	1.24	6.89	2.59	2.21	1.31	2.63	0.96	2.70	1.25	.72	.26	....	....	2.45	5.06
H	10.80	7.67	3.85	0.95	8.39	2.67	2.41	0.92	2.72	1.14	3.38	1.35	0.85	0.21	0.99	0.41	3.19	5.45
Average of schools	8.30	6.36	3.92	1.29	7.06	3.49	2.26	1.19	2.57	1.11	2.50	1.09	0.75	0.23	1.11	0.51	2.99	4.79
Highest..	10.06	9.16	4.48	2.11	8.57	4.72	2.70	2.25	2.80	1.63	3.38	1.38	0.95	0.26	1.45	0.65	4.00	6.20
Lowest..	6.54	4.45	3.25	0.79	4.95	2.30	1.57	0.79	2.17	0.96	1.60	0.63	0.56	0.17	0.76	0.33	2.45	3.63

Several outstanding facts may be set down:

(1) Pupils can correctly solve five times as many problems of the type of Test I (simple removal of parentheses and changing of signs) as they can of Tests II, IV, V, VI—this in spite of the fact, for example, that the average number and kinds of steps and operations necessary for solving each problem in the first two tests are almost the same, being for Test I, 3.5, and for Test II, 4.2.

(2) About the same number of problems can be solved per minute in Tests II, IV, V, and VI, again regardless of the kinds or number of operations used in each test. These data reinforce our conclusions that the relative difficulty of different types of problems cannot be obtained by a quantitative analysis of the problems concerned. Again, we have to date no known method of equating difficulty in different types of algebra problems. These points emphasize our contention that any standard test should be so designed as to test for one or at most two or three fundamental operations.

Furthermore, the data given above bear directly on the question, To what extent is instruction in first-year algebra making habitual

certain "mechanical" processes represented by these tests? The answer is direct: To only a very slight extent. Instruction resulting in a capacity for solving correctly less than one factoring problem per minute cannot be said to be efficient, especially when one of the eight schools is securing a skill three times as great. *It is the higher attainments represented by the work of these schools that are of significance to us, rather than the types, as they point out the possibility of practicable efficiency.* This should be the primary function of the standard test.

The blame cannot be laid solely to the door of classroom instruction. Rather it should be laid on the teacher's *organization* of her classwork as expressed through her *teaching emphasis*. The figures given above show that no school is highly efficient or decidedly deficient in perfecting all kinds of processes. All schools are relatively efficient in the perfecting of some of these habitual processes. Clearly our results point to a great variability of teaching emphasis, some teachers spending their time making automatic certain operations, others laying the stress on other processes. Our data point to the need of a statement of the standard amount of efficiency to be worked for by each teacher of algebra and of a more intensive study of methods of perfecting the particular manipulations.

A seeming lack in the presentation of the foregoing data is some measure of variability. This will be expressed in the final standards in the form of the limits of the middle 50 per cent of the distribution. It has not been deemed expedient to take the time to compute these in this preliminary report.

Our data thus point to lax methods of habit formation in the learning of these mechanical processes and to a decided lack of emphasis on ideals or attitudes of accuracy. But the most pertinent evidence which we have on these points is found in connection with an analysis of (1) the particular problems which pupils are able to solve in each test, and (2) the specific errors made by pupils in solving particular problems.

It has been assumed that difficulty-to-the-student will be indicated approximately by the percentage of pupils correctly solving the problems in the tests. Careful study of the data in Table VI

will therefore aid us materially in the redesigning of our standard tests. It was intended (although not exactly carried out) to design the tests in accordance with the principle that the problems should be arranged in cycles, those problems necessitating exactly the same steps recurring every so many problems. This would enable us to compare the record of one pupil with that of another without having a specific test for every particular operation used. The data shown in Table VI for Tests I, III, IV, V, and VII in the main conform to this practice. That is, those problems utilizing the same specific operations are, in general, correctly solved by approximately the same proportion of pupils. In the remaining tests, II, VI, VIII, however, while there is a rough paralleling of types-of-operations and proportion-of-pupils-solving, there is need for a much more detailed study of the problem. As a definite guide to the standardizing of the tests the data will be of great service. The study of the returns to date seem to indicate that the cycle principle must be adhered to strictly throughout the tests. The recurring problems must involve exactly the same steps in solution and the cycles must be of exactly the same size—otherwise the material will not offer comparable results.

The standardizing of tests and of the teaching process will, furthermore, be much clarified by a detailed study of the particular errors which pupils make in solving these problems. Table VI and the descriptive list following present the data on this point.

DESCRIPTION OF ERRORS ACCORDING TO NUMBER IN EACH TEST

TEST I

No. of Error in Table VII

1. Incorrect multiplication of figures.
2. Failure to change signs with − sign outside parenthesis.
3. Failure to use correctly with − sign inside parenthesis.
4. Failure to follow directions.
5. Error in writing.
6. Used + sign inside parenthesis incorrectly.

TEST II

1. Incorrect multiplication of figures.
2. Failure to change signs with − sign outside parenthesis.
3. Failure to use correctly with − sign inside parenthesis.

TABLE V

THE PERCENTAGE OF 100 PUPILS (SELECTED AT RANDOM WITH AN EQUAL PROPORTION FROM EACH SCHOOL REPRESENTED) WHO WORKED CORRECTLY CERTAIN PROBLEMS IN TESTS I TO VIII AND TEST B

Problems	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Test I	96	88	82	87	91	84	82	94	99	85	79	98	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" II	57	56	29	44	55	66	54	73	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" III	91	50	84	98	14	63	75	90	37	86	85	19	39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" IV	83	38	32	85	25	78	41	30	74	30	85	34	42	89	49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" V	55	54	51	54	57	53	57	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" VI	69	64	66	47	75	64	51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" VII	31	.....	35	8	46	2	57	0	39	0	43	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" VIII	91	32	24	51	85	27	51	22	44	37	36	41	68	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" B	68	54	89	80	46	38	31	13	61	67	42	28	20	6	12	61	66	16	37	79	33	0	16	8	70

TABLE VI

TYPES AND NUMBER OF ERRORS MADE BY 100 PUPILS IN WORKING PARTICULAR PROBLEMS IN TESTS I, II, III, V, AND VI

Number of Error	Problem Number																										Total Number	Percentage of Total	No. per Problem
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28			
													Test I																	
1	3	2	3	4	2	8	1	1	1	4	15	1	.....	2	2	1	2	2	2	3	1	3	4	.....	.....	.....	.....	.....	67	28.2	3.0
2	.....	10	16	9	.....	10	17	.....	.....	.....	8	.....	.....	.....	9	.....	9	.....	10	1	.....	7	8	.....	.....	.....	.....	.....	114	47.9	9.5
3	.....	.....	.....	.....	7	.....	.....	5	.....	9	.....	.....	7	.....	.....	1	.....	6	.....	.....	2	.....	.....	2	.....	.....	.....	.....	39	16.4	4.0
4	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	0.8	1.0
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	3	1	2	.....	2	.....	.....	.....	2	1	.....	1	.....	.....	.....	.....	.....	.....	14	5.9	1.8
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	0.8	1.0
Totals	4	13	19	13	9	18	18	6	1	15	26	3	10	2	13	2	11	8	14	5	3	11	12	2	.....	.....	.....	.....	238		
													Test II																	
1	1	2	2	3	2	9	11	7	1	5	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	44	7.6	4.0
2	.....	.....	29	29	19	1	25	9	16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	128	22.2	18.3
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0.2	1.0
4	1	1	2	6	3	10	5	4	3	5	3	2	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	48	8.3	3.4
5	.....	1	2	.....	2	1	3	1	2	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17	3.0	2.1
6	33	35	27	25	23	4	14	12	8	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	183	31.8	16.6
7	7	5	9	4	4	5	6	4	.....	2	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	48	8.3	4.4
8	.....	.....	.....	.....	1	1	2	2	.....	1	.....	3	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11	2.0	1.0
9	1	1	40	.....	1	1	.....	.....	.....	1	.....	4	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52	9.0	6.5
10	.....	.....	.....	2	1	2	1	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	1.4	1.3
11	.....	.....	2	.....	1	5	.....	1	.....	2	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	2.3	1.9
12	1	2	3	.....	2	4	.....	.....	1	.....	1	2	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18	3.1	2.0
13	1	1	1	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	1.0	1.0
Totals	45	48	117	70	60	44	67	41	31	18	5	15	6	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	577		

1			2	7												TEST III																						
2		4	53	5					7	51	6				3		13				2				I		I	35	4.3	4.4
3							7		I		9	14	2	8	8	55		21		9		7		30				231	28.5	21.0
4				I			3	2							I						3				14			75	9.3	9.4
5																	3				2						2	7	0.9	2.3
6							I							I	I													9	1.1	2.3
7																												I	0.1	1.0
8							I							I						8	3				I			21	2.6	4.2
9						50											74				2		21					98	12.1	32.7
10																									I			51	6.3	25.5
11													29															29	3.6	29.0
12																										24		24	3.0	24.0
13		4	11	2		5	8	12	2	10	1		20	19	4	2	8	7	5	19	5	19	4	3	9	2	6	6	3	3	0.4	1.5
14				I	I	2	I	I					2						5							3				106	24.2	7.5
15																I								I	I	I	2			8	1.0	4.0
16																			I											10	1.2	1.4
17																														4	0.5	1.0
18																			I											I	0.1	1.0
29							3							3																3	0.4	3.0
Totals		8	66	16	I	57	23	15	10	61	16	14	53	32	6	14	63	97	32	19	22	31	11	25	40	20	21	30	6	3	809							

TABLE VI—*Continued*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total Number	Percentage of Total	No. per Problem
									TEST V									
1	14	10	13	14	11	8	5	5								80	22.1	10.0
2	6	5	19	7	7											44	12.2	8.8
3	14	11	11	13	7	6	4	6								72	19.9	9.0
4																		
5			I		3											4	1.1	2.0
6		I							I							2	1.6	1.0
7	10	11	8	9	10	9	5	3	I							66	18.2	7.3
8	10	9	8	11	6	3	I	2								50	13.8	6.3
9	2	4	5	4	8		I									24	6.6	4.0
10	I	2	2	5	3	2		I	I							17	4.7	2.1
11							I									I	0.3	1.0
12																		
13	I					I		I								3	0.8	1.0
Totals	58	53	67	63	55	29	17	18	3							363		

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total Number	Percentage of Total	No. per Problem
									TEST VI									
1																		
2	5	34	9	8	10	15	24	10	10	12	6	2	1			146	39.5	11.2
3																		
4																		
5																		
6		6	7	21	1	6	10	4		3	3					61	16.5	6.8
7																		
8																		
9		3	1	6	4	4	4	7	2	2	6	4	1	1	1	46	12.5	3.3
10							2			1						3	0.8	1.5
11			9						1							10	2.5	5.0
12																		
13	1															1	.3	1.0
13	6	10	9	8	6	7	7	6	3	5	3	2	1			73	19.7	5.6
14		2		2												4	1.1	2.0
15		5	1	3	3	4	1		2	1	1	1				22	6.0	2.2
	12	50	36	49	27	36	49	27	18	24	19	9	3	1	1	371		

4. Failure to combine like terms or reduce to simplest form.
5. Error in writing; omission of symbols, etc.
6. Ignoring + or − sign and multiplying across them.
7. Ignorance of operations needed.
8. Addition instead of multiplication symbol following parenthesis.
9. Omitted multiplication by symbol preceding or following parenthesis.
10. Incorrect addition or subtraction of like terms.
11. Omitted terms in the answer.
12. Faulty multiplication of symbols.
13. Failure to follow directions.

TEST III

1. Incorrect multiplication of figures.
2. Multiplied exponents instead of adding them.
3. Added exponents instead of multiplying them.
4. Divided exponents instead of subtracting them.
5. Error in writing.
6. Multiplied exponents instead of subtracting them.
7. Multiplied denominator instead of numerator.
8. Incorrect addition of exponents, e.g., $9x^m \cdot 7x = 63x^m$ instead of $63x^{m+1}$.
9. Regarding x^{-1} as 1 instead of $\frac{1}{x}$.
10. Regarding $y^{-2}x^2$ as xy (second powers canceling each other).
11. $(x^0)^2$ called x^2; 0 power equivalent to first power.
12. Subtracting exponents instead of multiplying them.
13. General inability to use operation.

14–19. Scattering errors.

TEST V

1. Incorrect multiplication of figures.
2. Incorrect addition or subtraction (− quantity the larger).
3. Substitution of wrong figures.
5. Error in writing.
6. Incorrect addition or subtraction (+ quantity the larger).
7. Incomplete.
8. Inability to solve this type of problem.
9. Incorrect substitution.
10. Addition in place of multiplication.

11–13. Scattering errors.

TEST VI

2. In transposing terms neglected to change signs.
5. Error in writing.
6. Incorrect addition.
9. Incomplete, not reduced to fractional form.
11. Subtracted instead of added.
13. Inability to handle operation.
14. Multiplied across + or − signs before parenthesis.
15. Incorrect division (inverted numerator and denominator).

Discussion of specific types of error—Test I: Over one-fourth of the errors made in this simple test may be ascribed to lack of fixing the multiplication tables in arithmetic. It is necessary to recall that Test I shows evidence of being fairly well automatized—the only test in the eight of which this can be said. Furthermore there being but few different algebraic processes involved (only two to five operations possible) the actual proportion of total errors found to be due to lack of automatization of fundamentals in arithmetic must necessarily be larger. The actual number of errors of any one type is small. Even so, each of the pupils on the average made two errors in solving twelve problems of this simple type. It is clear, however, that there is a need for more intensive drill on the process of removing parentheses, especially of the type of problem having the minus sign before the parenthesis. Table VII shows that the problems involving this operation, 6, 7, 11, 19, etc., are the ones in which errors most frequently occur and that the problem is much more difficult to the student if a minus sign is used both inside and outside the parenthesis. The data confirm the view that *teachers should analyze problems into constituent operations and drill on those that prove most difficult.* The use of the minus sign is the stumbling-block in this most simple of algebraic operations.

Test II: With a but slightly more complex problem and twice as many possible types of error we find in Test II a relatively small proportion of arithmetic errors. In 100 pupils there were found on the average four who made multiplication mistakes in solving each problem. The results of Test II confirm our interpretation of Test I that *the use of the minus sign in removing parentheses is a source of weakness* (*22.2 per cent of errors were of type 2*) and an element of instruction on which greater stress should be laid in drill. One-third of the nearly 600 errors made by 100 pupils in solving twelve problems are made in ignoring a plus or minus sign before parentheses (error No. 6). The data show that this mistake is common to all of the eight schools but one. Clearly this is a type of error that should have been eliminated by class drill. To repeat: First-year algebra should make automatic the removal of parentheses. The evidence leads us to think that it is not doing so. If the data presented here are valid, 8 per cent of the 100 pupils

show distinct evidence of absolute inability to handle this operation. About 15 per cent of the errors may be ascribed specifically to carelessness in writing (omitting terms, etc.). Nearly all the errors that were made emphasize the careless and slipshod work done by our pupils, a condition due primarily to weaknesses in the teaching process.

Test III: In the manipulation of exponents a few definite types of errors occur, viz.: Exponents are multiplied when they should be added and vice versa; problems of the type $9x^m \cdot 7x = ?$ are almost invariably solved as $63x^m$ (error No. 8; another example of multiplying exponents instead of adding them?); the use of negative exponents has not been permanently fixed by at least half the pupils (errors Nos. 9 and 10); the use of the zero power has not been learned; 24 per cent of all errors made point to an inability to handle exponents in general. *The tabulations above emphasize again the need for analysis and sound distribution of teaching emphasis on the difficult operations.* Complete mastery of the fundamental operations should be insisted upon.

Test V: The surprisingly large number of errors made in this test bring out again the weakness in the mastery of the arithmetic fundamentals: on the average over three errors per person in solving eight problems. Furthermore, one pupil in five made an error in addition, subtraction, or multiplication in solving eight problems. Further evidence of careless methods is seen in the fact that 20 per cent of the errors made are errors in substituting wrong numbers and 20 per cent more are due to incomplete solution. As with the preceding relatively simple operations so with simple substitution, many pupils are not able to handle successfully this process. *Clearly, if elementary algebra should mechanize any "preparatory" operations that are used repeatedly in problems requiring independent thinking it should mechanize simple substitution. That it is not doing so is strongly suggested by our data.*

Test VI: In the solution of simple equations of the first degree with one unknown, eleven pupils out of a hundred neglect to change signs in transposing terms. Two-fifths of all errors made are of this type. The deduction from such data is clear: *a primary purpose of elementary algebra should be to make automatically accurate*

just such processes as changing signs in transposing terms. Teachers interested in improving the outcomes of instruction should use some such method for determining the difficult elements in the "learning process" in algebra, and redistribute their teaching emphasis in conformity to the difficulty of the operations in question. It is just such analyses as we are making here that will suggest to the teacher "relative difficulty" of operations and will point to a sound solution of the problem.

SUMMARY OF CONCLUSIONS

1. The subject-matter of first-year algebra should be definitely organized in the form of a specific statement of (*a*) the "mechanical" processes which should be drilled until perfectly habitualized; (*b*) the typical "original" or applied problems in which should be given at least a definite minimum of practice in the application of the mechanical processes to new problematic situations. (Such an organization is tentatively outlined above.)

2. The efficiency of instruction in the mechanical processes may be tested by a series of time tests of the nature of those given herewith, each test being so designed as to test for one, or at most two or three, closely related processes.

3. The efficiency of instruction in developing skill in the solution of "original" problems may be measured by a standard scale of representative problems (the relative difficulty of each problem having been determined by some of the methods discussed herewith), the problems being separated by definitely determined intervals of difficulty.

4. The study leads to the conclusion that the relative difficulty of the problems composing standard tests cannot be determined by the teacher-judgment method. There is evidence to support the view that difficulty-to-the-pupil will be indicated, at least approximately, by the proportion of a large group of pupils solving the problems in question. Difficulty of problems and relative "teaching emphasis" can be determined completely only by a detailed psychological analysis of each of the mental processes involved in the learning of algebra.

5. Standard tests, if representative of the conditions of algebra instruction generally, may be of definite service to the teacher and the supervisory officer by providing (1) objective measurement of the efficiency of instruction; (2) means of comparing efficiency with that of other representative teachers and systems; (3) means of determining particular weaknesses in the learning and teaching processes.

6. The study of errors made by pupils indicates that *inefficiency in algebraic solution is due primarily to lack of mastery (habitualization) of a few typical operations which recur frequently in such solution.* (Such operations include, e.g., the use of the minus sign in removing parentheses, principles concerning the addition and multiplication of exponents, the use of negative exponents, the use of the zero power, simple substitution, neglecting to change signs in transposing terms; etc.) This condition points to a need for a thorough study of (1) the psychology of the learning process in algebra; (2) the relative emphasis that should be placed on the teaching of certain processes, i.e., the relative drill emphasis.

EDUCATIONAL NEWS AND EDITORIAL COMMENT

Confession of Faith

There are times when the *School Review* publishes statements and conclusions with which some member of the editorial staff does not agree. Indeed, it is altogether likely that a careful canvass of the situation would bring out the fact that the various members of the board of editors sometimes disagree with each other. That these disagreements and inconsistencies exist disturbs us not at all; in fact, we think of it as one of our virtues that we editorially tolerate, in the pages from which we might exclude them, statements which we personally feel sure ought to be modified.

Having thus pointed out our breadth and liberality, we shall, with less hesitation, venture a New Year's confession. The *School Review* is edited in an atmosphere through which someone looks at all articles and contributions. Seen in this atmosphere, certain articles do not seem worth printing, and our readers do not get them. Sometimes our friends tell us that our judgment is bad, and we become introspective and find that we are really more set in our opinions than we had supposed. It has seemed fitting, accordingly, that we should try to make a confession of faith, not so much for the purpose of converting others as for the purpose of explaining ourselves. If we are biased, we are, of course, only exhibiting our human nature, but it is fair that the readers of the *Review* should know at least as much about these fundamental convictions or, if one prefers, prejudices as we ourselves do. It may be that the catalogue is not complete. It may be that some reader will wish to convert the *Review* or point out prejudices of which we have not been aware. The pages of the *Review* will be open to all kinds of communications and contributions—with the usual restriction that we shall publish only what seems really worth printing.

The articles of our faith are these:

It is the duty of each state to supply secondary education to every boy and girl in the state. So far as possible, local communities should perform this duty and should equip high schools. Where the local community cannot equip and conduct a good school, some indirect provision should be made. In many cases, the state should assist, either by subsidies or by contributions to tuitions.

The course of study should be rich and should be well organized. It should be rich in the subjects which have long been traditional; it should be rich in new courses. There should be science courses, and courses in civics and the practical arts. The internal organization of these courses should be such as to make it clear that the schools have not been overwhelmed by the new subjects. There should be within each subject and within each student's curriculum a definite, well-ordered coherency.

The secondary school should reach downward into the grades, making itself responsible for all school work beyond the sixth grade. It should reach upward and organize all that is done to the end of what is now commonly the Sophomore year of college. It is in accordance with the nature of the students that secondary education should begin after the sixth grade. The proper organization of courses of study is possible only when the various forms of instruction which now duplicate and overlap and conflict in the high school and junior college are all organized as part of one coherent plan.

Teachers and administrative officers in secondary schools need more training. First, they need more knowledge in the subject-matter which is taught to students. Secondly, and no less emphatically, they need to know educational problems and the methods of attacking and solving these problems. This means that teachers must study their students and the reorganization of courses. Principals must be active in standardizing courses and departments. The complex life of a modern secondary school calls for forms of control which were not necessary in earlier days and under simpler conditions. In the degree in which high-school officers study their problems, they will be able to control the forces centering in the high school. It is futile for the high school to talk about detaching itself from higher institutions. It is idle to try to organize a high school without insight into the whole plan of educational and social life. It is presumption for high-school teachers to repudiate tradition or reject the recommendations of higher institutions until, by careful study of high-school problems, a plan of operation has been developed which is so firmly based on verifiable principles that the plan will compel all intelligent students of education to recognize its objective validity.

The social and athletic activities of students are quite as fundamental as the strictly academic activities. All should be organized after close study of the problems involved. As details in this connection, it may be pointed out that sports including all members of the school are more

wholesome than inter-school games, especially when these involve active participation only by the few. High-school fraternities are bad and should be replaced by well-regulated forms of general social life.

The school opportunities offered to students should be extended so as to include more hours in the day and more weeks in the year. As matters stand at the present time, there is a very large fund of available student energy which goes to waste because high-school students do not organize their time well.

Vocational guidance for pupils is essential. The selection of courses of study will become intelligent in the degree in which this selection is directed toward the future of the students.

Supervised study is more important than recitation.

The high school should remain free and secular. The high school has developed in recent decades rapidly and extensively because of its democratic and non-sectarian character. It should not be impeded in its growth and influence by any complicating issues of sect or class. The effort to use the school as a substitute for church organization or as a prop to church activities is a menace to democracy.

Devices must be adopted for economizing the time of students who are preparing for practical life. The efforts to secure economy should always be coupled with a recognition of high scholarship. Excess credit for high-grade work, rapid promotion for the best students, and a selection of the essentials in all courses are among the most obvious and legitimate devices for securing the right kind of economy.

It may seem hardly necessary to reaffirm confidence in the elective system and in the cosmopolitan high school. It is perhaps unnecessary to comment on the importance of recognizing individual differences among students.

These are the items of the creed of the *School Review*. Whatever promotes the movements advocated, whatever will carry the high school forward along these lines, will receive the support of the *Review*. The *Review* renews its urgent call for contributions and communications in a campaign which is taken up with new confidence in a new volume.

C. H. J.

The New Administration of Chicago Schools

The administration of the schools of Chicago has been completely reorganized. John D. Shoop, for many years first assistant superintendent, has been made superintendent, and the Board of Education,

with several new members, has been organized under the presidency of Jacob M. Loeb. Both have long served the schools of Chicago, and their administration begins with promise of success. Mr. Loeb, in his inaugural address, sounds a keynote commendable in the highest degree. "As we do well or ill," said Mr. Loeb, "so shall the children of Chicago do well or ill. It will not suffice that we keep the schools at the level of the past; we must make them better."

This admirable statement will receive the commendation of every friend of public schools. Especially in large cities the fact is too often lost sight of, that schools, after all and before all, exist for the children. Schools are often made more important than schooling. Buildings, grounds, and equipment, of vital importance in themselves, too frequently engross an undue share of administrators' energies. In short, the unwieldy system itself constitutes an enterprise, which in the business world, would require the superintendence of a master-hand. There is always danger, when details of management are distributed among committees of a large board, that each committee, by very faithfulness in discharge of its own functions, may exaggerate the importance of these special duties. In so doing, a multitude of committees act as a detriment to the ultimate purpose of the entire enterprise, called by President Loeb, "the good of the children."

More and more the cities of America are coming to realize that efficient schools like efficient business enterprises must have their administrative functions centralized. To this end a highly trained, thoroughly competent, energetic officer, a city superintendent, should administer educational policies and stand or fall upon their success. In hearty co-operation with him there should be a city school board, which, if not small, should be directed by a vigorous man. This board should possess the bigness of mind, in the first place, to employ a skilled expert, in whom it has utmost confidence, and, in the second place, to leave him unhampered in the discharge of his duties. The board, thus content to delegate details of administration, may well determine the general policies of education it wishes the superintendent to carry out. A board should determine also the business policy of the school system; but the purely administrative side of business policies may wisely be delegated to a business manager, standing in relationship to the chief executive official, as assistant superintendent. It may be pointed out that large universities and some city systems now employ such an officer, subordinate to the president or to the superintendent, respectively. Experience demonstrates that when the administrator of business policies is

co-ordinate in power with the administrator of educational policies, the former so dominates the latter that education itself languishes.

In short, the *School Review* believes that the ideal arrangement for a city system must be based upon a clean-cut division of powers, the essence of which is a sharp distinction between the determination of general educational and business policies, and the administration of them. To this end, a city school board, appointed by the mayor and approved by the council, a board of equals to insure intelligent discussion, headed by a capable presiding officer, should determine educational policies, considering solely the good of the children and the financial status of the city. Under this board, there should be one administrative expert, a superintendent of schools, and, as an assistant superintendent, a business manager of schools. These two men, given a free hand in administration, and consulting with the board in matters of general policy, are agents of the board, which in its turn is responsible to the city officials and through them represents the people whom the schools serve.

The *School Review* wishes that the Board of Chicago might see its way clear to the employment of a business manager as capable in his duties as Mr. Shoop is in his. The sum of $8,000 yearly so expended would be ten times saved, especially if competent men were given as free a hand in administering the system, just as the executive officers of a large industrial enterprise are free.

To say that the infinite number of petty details of administration ought not to be left to committees is no reflection upon the Board of Chicago or upon any board. It is simply common-sense, based upon the experience of every large enterprise from the administration of a mighty army to the management of a huge meat-packing corporation. With the additional changes in organization suggested, the new school officers of Chicago would be far better equipped to carry out the duties upon which they are so earnestly and conscientiously entering. To the Board, to Mr. Shoop, to Mr. Loeb, the *School Review* extends its best wishes as they begin their labors for Chicago and for her children.

Conference of the University of Chicago with Secondary Schools

(April 14, 15, 1916)

TOPIC: QUANTITATIVE DEFINITION OF COLLEGE AND HIGH-SCHOOL UNITS

The Joint Committee on the Program of the Conference of the University of Chicago with the Affiliated High Schools finds it necessary to change the date of the meeting. The date was originally set for

April 21. It appears, however, that this falls both on Good Friday and in the vacation of the Chicago high schools. The date has consequently been changed to the week preceding. The departmental conferences as arranged by this committee will be held in two sections, the first on Friday afternoon, April 14, and the second on Saturday morning, April 15. If it is desired by any section, Saturday, April 15, can be used for purposes of scientific excursions, visiting commercial plants, or other purposes, and there is no objection whatsoever to an afternoon session on Saturday in the case of any particular section which desires to meet.

The joint committee arranged that the general program of the session on Friday evening and the programs of the departmental sections should, so far as possible, turn about the topic, "Qualitative Definition of College and High-School Units." It was deemed advisable for a subcommittee to draft in some detail a statement of the meaning of this subject so that harmony should prevail in the organization of the various departmental conferences. The report of this subcommittee, consisting of Messrs. Church, Hosic, and Judd, is embodied in the paragraphs that immediately follow.

The problem which is suggested by the foregoing title grows out of the fact that heretofore definitions of units as given by the North Central Association and other standardizing bodies have been very largely quantitative in character. All of these definitions have told the number of hours during which classes must meet and the number of weeks in the year during which classes shall meet, but there has been very little effort to discriminate between advanced courses and elementary courses. There has been very little effort to point out the emphasis which should be laid upon particular topics within a given scheme. Indeed, the definitions as now printed usually enumerate without emphasis a whole series of topics, many of which are very trivial and some of which are of major importance. It is now proposed that we follow the lead of the North Central Association, which is attempting first of all to ascertain what the actual practice of high schools is, and that we follow the lead of this association farther in attempting to make some discriminations which are based upon the qualitative characteristics of units.

For example, the North Central Association is now discussing the general question whether the same amount of credit should be given either toward high-school graduation or toward college admission for courses that are given in the Freshman year and courses that are given in the Senior year; or, to put the matter in still another form, is the high-school Senior to be allowed to take courses which are also open to the Freshman

and receive full credit? In this connection it may be remarked that the University of Michigan is allowing certain courses taken in the junior high school to be counted toward college admission. One of the problems, therefore, is the problem of grading courses as elementary and advanced courses and distinguishing between the topics which may legitimately appear at the one level or the other.

In the second place, it has appeared important to a number of high schools of this immediate environment to distinguish between work done at a high level, that is, with a high grade, and work that is done at a low level, that is, with a mere passing-grade. Indeed the University by its legislation is prepared to enter into negotiations with high schools which are prepared to redefine the units in terms of the grade of work done by the student.

A third problem can be defined by referring to the fact that credit in certain courses given in the high school depends upon an extension of the class period. For example, laboratory work which is not prepared for outside of class periods usually is credited only when the exercises are twice as long as ordinary class exercises. In view of the fact that supervised study is now being introduced into courses other than laboratory courses, it may seem necessary to modify the amount of credit again in terms of the method of conducting the courses. How far should courses in various departments be defined in terms of the kind of work that is done, and can more credit be given for certain kinds of preparation than for others? It is quite possible that in a given course the credit should be distributed at different stages of the course on a different basis, that is, part of the year laboratory work or supervised work may be more in evidence than at other periods. Here again the methods of procedure are more significant than mere external qualitative divisions.

The general problem of relating one department's work to another raises the question whether a student should be given full credit for a course in case he is pursuing five other courses at the same time. How far should a unit in a given department depend upon assignments that are independent of the amount of other work that a student is doing, and how far is the work of a given course modified by the other engagements of a member of the class? In each of the foregoing cases the problem of emphasis upon particular topics and the method of treating different portions of the course will suggest themselves as questions that need to be considered.

Finally, quantitative tests have been undertaken in various departments. Such studies have long been familiar in evaluating elementary

work, and the examination plan of evaluating courses is familiar in secondary schools. The English Council has undertaken quantitative studies of English courses, and several elaborate studies of courses in mathematics have been reported. Some review of tests of high-school units would be an appropriate part of the program of sections.

Very truly yours,

H. V. CHURCH
Chairman of the Committee on Conference Program
NATHANIEL BUTLER
Chairman of the Committee on University Relations

THE FIFTH ANNUAL MEETING OF THE NATIONAL COUNCIL OF TEACHERS OF ENGLISH

Twenty-five states represented and over five hundred present—that is the record of the fifth annual meeting of the National Council of Teachers of English. The keynote of the several sessions was definite progress in the solution of definite problems. Chief among these were the improvement of speech, the development of the school library, the preparation of school and college teachers, the vitalizing of oral composition, and the selection of essentials in English grammar.

The work of ten committees was represented at the meeting. Among these committees were those on Plays, on the Reorganization of the High-School Course, on the Work of the First Six Elementary Years, on the Labor and Cost of English Teaching, on the Preparation of College Teachers of English, on English in the Normal School, and on American Speech. The Committee on Scientific Standards made no report but will soon publish in the *English Journal* a bibliography bringing the list of investigations in the field of English up to date. New committees were provided for to deal with the development of libraries and with the subject of economy of time in the teaching of English. Among the resolutions adopted was the following offered by Professor F. N. Scott, of the University of Michigan:

Resolved, That the National Council of Teachers of English approves the movement to raise the academic standard of the profession of journalism and, therefore, recommends to secondary-school authorities that no student be encouraged to enter the newspaper profession without further academic training than is afforded by the secondary school.

What Lies Back of Co-operation in Teaching English

L. H. Jones, superintendent of the Indianapolis schools in the International Congress of Education held in Chicago in 1893, said:

> Language, writing, and drawing considered in themselves are purely arts; their end is skill, ... language . . . . has no ennobling ideas in itself. Only when these branches are used in the expression of ideas whose origin is in some other field of thought do they become charged in themselves with thought, or feeling, or motive as to become individual factors in spiritual development.

Here we have the essence of the movement which, starting twenty-five years ago, resulted in the subordination of formal English grammar to the place of incidental study which it occupies today. Moreover, the statement of Superintendent Jones may be said to be the basic doctrine of the movement, in its incipiency in 1915, which takes the ground that formal classes in English, especially in English composition, are occupying altogether too large a place in the program of the elementary, and especially in the program of secondary, schools. This new idea urges less time for formal English classes, and insists upon more and better instruction in the mother-tongue in departments other than English. The leaders desire that English composition be taught in all classes, in all school activities at all times, by every teacher, both by his example and by careful supervision of his pupils' oral and written work. Through these means, all teachers are to help establish good language habits. The movement for correlation with "other subjects," as yet in its early stages, is most significant.

To put this in another light, language lessons were introduced about 1860 to 1870, as a substitute for the unspeakable grind of grammar. Today these language lessons have themselves to face somewhat the same criticisms that formal grammar faced twenty-five years earlier. Just as the study of grammar, with elaborate formulas of parsing, analysis, diagramming and the like, became an end in itself and lost whatever educational import it may ever have had, so today language lessons have become stereotyped, ends in themselves, whose educational value is extremely doubtful. Most English compositions written for prescribed classes in composition, of whatever grade, from elementary school to university, are exercises performed mechanically to meet requirement, generally disliked by the pupils. They are utterly devoid of the viewpoint of authorship. The pupil's attention is directed not upon the subject-matter of his thought, but upon the formal elements of his composition, structure, style, and diction. This is not the way to teach pupils to write and speak.

Formal English composition courses are drill exercises in the mechanical elements of writing or speaking. As such they must always hold a place in the curriculum. Drill is absolutely necessary to secure mechanical and elementary rhetorical accuracy. The place for such language lessons should be confined to classes in the English department frankly given over to formal drill; but the great bulk of English composition ought to be taught in connection with other subjects. The geography lesson, the theme in history, the topical recitation in civil government—these, and numberless similar occasions furnish the best practice ground for establishing language habits. As Mr. Jones said in 1893, "In some other field of thought, language lessons become charged with feeling or motive." In these other fields we have the viewpoint of authorship—an overwhelming interest in the subject-matter, an earnest desire to be "the servant of an idea"; this the pupil of eight or eighteen or twenty-eight must have. He must write or speak with his mind centered upon the message he wishes to proclaim.

Samuel Kirkham and his followers in 1823 were twenty-five years ahead of their time in directing the pupil's attention away from rules of formal grammar to the ideas represented by grammatical relationships. Greene and his followers in 1847 were twenty-five years ahead of their time in insisting that the sentence rather than the work is the basis of the study of English grammar. Swinton with his language lessons in 1873 was a quarter of a century in advance of his time in subordinating formal grammar to practice in writing and speaking as the only means of attaining proficiency in these arts. In 1893 Superintendent Jones and a few other school men were twenty-five years in advance of their day in asserting that the best training-ground for practice in writing and speaking is not formal English composition classes, but in other fields of thought. Today we are just catching up with these latter-day leaders.

About the middle of the century the old conception of grammar promulgated by Murray and his followers, that grammar is the art of speaking and writing with correctness and propriety, was changed. Educators, influenced by the common-school revival, the movement for oral instruction, object teaching, and inductive teaching in general, came to realize that the grammar of a language is not an art but a science. Language is not an art of acquirement; it is an art of representation. English grammar and its successor, language lessons, are not content studies. The grammar stage in any language study is a purely reflective stage, a self-conscious attitude coming late in the series of vernacular studies. It can be of assistance in securing command over the vernacular

only in a secondary or subordinate sense. In much the same way language lessons are not a content study; they are drill exercises in the mechanics of grammatical and rhetorical accuracy; they are not fertile fields for practice in writing or speaking. No drill exercise in which the attention of the performer is centered primarily upon method is ever free from constraint. Vital practice in the use of the mother-tongue approximates its greatest value when the student, having roughly thought out his scheme of procedure, breaks free from conscious attention to the mechanical details of his composition, and, wrapped in the relation to each other of the ideas he wishes to present, advances freely and fluently toward his goal. Then, after the first rough draft of his composition is completed, he is in a position to apply himself with intense interest to the question of reorganization, to the matter of sentence structure, to the proper selection of words. All these duties are motivated by the desire to give to his message the most effective vehicle of expression.

This attitude of authorship is just as essential for effective school exercises in composition as it is for the magazine writer, the editor, the lawyer. Language habits, both oral and written, exclusive of course of matters of mere mechanical accuracy, may be cultivated by the school, but not primarily in classes devoted solely to formal composition. Such is the educational doctrine that lies back of the movement for co-operation in teaching English.

COMMUNICATIONS

[The *School Review* welcomes communications touching upon personal aspects of school life. We are happy to publish the following sensible letter.]

WASAMSAW, TEXAS
December 10, 1915

To the Editor of the "School Review":

"Under him my genius is rebuked, as it is said Mark Antony's was by Caesar." How often true! Many of us cringe inwardly when in the presence of rich or distinguished men. A feeling of inferiority, coupled with chagrin, and perhaps a touch of resentment, stifles us. Our freedom from restraint which we feel among equals changes to a curious sense of oppression when we are among our superiors. Only the bigness of character possessed by a Benjamin Franklin stands unabashed in the presence of royalty.

A school officer often forgets this natural trait, or remembering it, inwardly exults in the prestige of his position, when dealing with subordinates. Not infrequently the rank and file of teachers are unduly humble in the presence of their superior officer; even worse, they perform every routine duty of their classroom with conscious terror of his disapproval. Sometimes this produces a high standard of efficiency in a school system; but more frequently it results in an unhappy, restless spirit of suspicion permeating the entire teaching force. A capable school superintendent has no pride of position. He has, to be sure, a sense of the responsibility of his position; he realizes that his supervisory powers are not perfunctory, but real; and that his subordinates must constantly be aware of his observation and attention. He demands efficiency. But with it all, a capable superintendent is more than a superior; he is a sympathetic friend with a cordial welcome and hearty handshake for his teachers; yes, even for his janitors. Indeed, a capable superintendent must go far more than half-way in making his teachers feel that while they are dependent upon his approbation, they are none the less fellow-workmen, each with a certain independence in his own sphere, co-operating with him for the good of the schools. Both teachers and supervising officer must remember the philosophy of the old saying, "A gentleman is a man who can shake hands with a king without feeling embarrassed, or shake hands with a coal-heaver without making him feel embarrassed."

Very truly yours,
JAMES MANLY

BOOK REVIEWS

The Dean of Women. By LOIS KIMBALL MATHEWS, PH.D. Boston: Houghton Mifflin Co. Pp. vii+275. $1.50 net.

This study deals with a subject which is of much more general interest than its title would suggest. The results to be secured from the college course is a subject which should be considered equally by parents and students, educators and administrators, and it is the suggestive treatment of this topic which makes Mrs. Mathews' book valuable to a vastly larger constituency than that to which it nominally appeals. "The ideal college woman would be a splendid product, cultivated and disciplined in mind, superb in physique, gracious and courteous in manner, unselfish, honest, self-controlled, and tolerant. These are all part of one's conception of what college graduates should be" (p. 226). The means for securing these results in the complex organization of the modern American university seem to be, according to Mrs. Mathews' views, chiefly in the hands of the dean of women and a group of women under her direction. "It is the ultimate aim of every dean of women to make as far as possible this dream come true. To that end she in reality is doing all her work. Her problems of living conditions, of student employment, of vocational guidance, of student discipline, of the social life, of the intellectual life—all these are but different aspects of the same fundamental purpose, to develop the finest and highest type of college woman" (p. 226).

Mrs. Mathews' description of the extraordinary equipment necessary to fulfil the duties of a dean of women is followed by the statement that "it is evident that no woman is fitted, by these standards, to be a dean of women" (p. 218). She is right in asserting that "any ideal which is worth conserving is always far beyond human attainment," and her glorification of the office will undoubtedly serve, not only to arouse in those women who hold it a truer valuation of their function, but to convey to the minds of university trustees and presidents that the office is not that of an upper housekeeper or even a "glorified chaperon."

The detailed analysis and description of the problems which confront the dean of women is based upon the conditions and methods found at the University of Wisconsin. The reader who surmises that the material was gathered and put in shape as one result of the "Wisconsin Survey" would record one white mark to the credit of that ill-advised undertaking.

It should be borne in mind, however, by all readers, by those interested in education in general as well as by those seeking information in regard to this special office, that Mrs. Mathews clearly does not intend the Wisconsin method to be followed mechanically or without adaptations to special conditions. In the presentation of different topics she places "The Intellectual Life of Students" as the seventh and last in order, although, to be sure, she never minimizes

its importance as she dwells on "The Problem of Living Conditions and Their Relation to Social Conditions," "The Problem of Student Employment," "Vocational Guidance," "Self-Government Associations," "The Social Life of Students," and "Problems of Student Discipline." The reader is tempted to ask whether if the intellectual life were put first some of the problems which seem of primary importance would not become secondary or even disappear entirely. If the intellectual life were taken as the cornerstone which must be laid in such a way as to serve for the structure which education is called upon by modern life to erect, one suspects that the dean of women would not have "to compromise with and conform to the wishes and requirements of a whole group of men deans" (p. 23), nor would the situation even arise when "a fractious student may appeal from her decision to a dozen other authorities besides the president and the faculty" (p. 23) or "her decisions be more apt to be appealed from and her authority overruled than would be the case with her confrère in a women's college" (p. 23). It is such possibilities as these which evidently exist at the University of Wisconsin which suggest that those interested in defining the position of dean of women as an administrative and academic office should see to it that the dean of women should not be an autocratic officer but rather the executive officer of faculties or boards appointed to carry out general principles determined upon by them as a part of the educational policy of the institution.

Mrs. Mathews has made a genuinely important contribution both directly and indirectly to the education of young men and young women.

UNIVERSITY OF CHICAGO MARION TALBOT

Principles of Composition. By PERCY H. BOYNTON, Associate Professor of English, the University of Chicago. Boston: Ginn & Co. Pp. xix+386. $1.00.

Mr. Boynton has evidently consulted many textbooks on English composition before writing the one before us. The general plan of the *Principles of Composition* is wholly orthodox—material, the whole composition, the paragraph, the sentence, diction, in the first half; the forms of discourse in the second half. He has treated his material, moreover, in an orthodox way, if by that phrase we mean in conformity to widely accepted ideas. The terms he uses are customary, the explanations he offers in line with the judgment of good teachers everywhere, the employment of exercises to illustrate and enforce his precepts is regular and undisturbing to the conceptions of the most rigid instructor.

But however wide has been his consultation, it is doubtful whether anywhere Mr. Boynton has found a better textbook of its kind. For so far as in plan and scheme he has been merely orthodox, he has been wise; and so far as in method and form he has been original, he has been constantly illuminating. In the chapter on "What to Write About," for instance, he distinguishes between the *presentation* of fact and the *interpretation* of fact, and every

Freshman who has ever speculated on the universe, as every Freshman worth sending to college has, will be grateful; the distinction is a real contribution to the philosophy of "material." In the chapter on "The Whole Composition," Mr. Boynton begins by saying that "with some definite point in mind, common material can be made to seem anything but commonplace." It is no new truth, but his application of it to the problem of organization is as helpful and convincing a piece of teaching as one need care to listen to. In the chapter on "The Paragraph," his development of Professor Wendell's old theory of the summation of a good paragraph by combining the first and last sentences is very much worth while. The entire chapter on "Sentence Interest" is admirably handled.

So one might go on through the book. And as he went on he would be bound to comment on the vigor of the style. Vigor in a textbook? Vigor, in a textbook. On p. 23, concerning "lifted" quotations: "The consequence is that these borrowed sentences are as streaks of scarlet against backgrounds of dusty brown. They burst out of their context like new wine out of old bottles." On p. 143, concerning the long loose sentence: "As [the reader's] drooping attention is spurred to a further progress, he gets into the state of mind of a group of soldiers upon a forced march, who pass through town after town as the end of day approaches, hoping in vain as each new church spire looms in view that at last a halt will be made for the night." On p. 157, concerning "national" use: "He addresses the nation of which he is a member; his aim is to make himself understood; and if he really means business he will use what from the point of view of his own country-men is a common or garden variety of vocabulary and get along without rare exotics." It is a style with certain elements of unloveliness, with a certain lack of consideration for euphony perhaps, but of practically unflagging briskness; an enlivening style, good like Beecham's Pills for children or adults.

Of course any honorable reviewer must register objections. The inclusion of the analysis of metaphor and simile in the section on "Elaborating a Paragraph Topic for Interest" is mere bravado. Description, again, the present reviewer will never see eye to eye with Mr. Boynton. Mr. Boynton's delight in systematization, when he writes of description, rises into passion; and we have "types of subject-matter," including "inanimate objects at rest," with their "color, light and shade, form and dimension, sound, touch, taste, odor, the effect upon the observer, and general descriptive terms," all catalogued, with exercises for each, to say nothing of "inanimate objects in motion," "human subject-matter—external appearance at rest," and so on—twenty-seven pages of it. Not so do men describe, nor learn description, but subjectively; by psychology, not by pigeonholing, the approach must be. And finally, the Freshmen for whom Mr. Boynton writes are a trifle keener, a trifle more knowledgeable, this reviewer fears, than the average. But the objections, when one considers the value of the whole book, are trivial. No college teacher of rhetoric can afford to overlook the volume; and few but will use it somehow.

University of Chicago James Weber Linn

English Prose and Verse from Beowulf to Stevenson. Edited by HENRY S. PANCOAST. New York: Henry Holt & Co., 1915. Pp. xxii+816.

The present volume, like the *Century Readings* and the two volumes of Professor Manly, is intended primarily to serve as a text in a survey course in English literature. Unlike either of the two other volumes, the amount of critical material is negligible; the absence of the usual biographical materials has enabled Mr. Pancoast to include in his book a wider range of selections than that of any similar textbook now in the field. Not only is the range wider, but he has happily permitted himself "to give some hint of the queer nooks and less-trodden paths that wait to be explored. We are sometimes prone," he says, "to become a trifle narrow and conventional in our literary judgments, to regard not so much what we like as what we are expected to like, and to pay too exclusive reference to the 'canonical books.'" Although it is not likely that the Sophomore taking a survey course for the first time will appreciate the force of this statement, the teacher should underline it and keep it constantly before him.

The selections from Anglo-Saxon literature are much fuller than those in the *Century Readings*, and the section on Middle English literature is (I have not the Manly book before me) more varied, I believe, than even Mr. Manly's selection. The one is given 23 pages, the second 26. Other periods of our literary history which it is possible for survey courses to muddle through are gratifyingly represented, such as the period from the death of Chaucer to Wyatt and Surrey, including the Scottish poets after Chaucer; the prose of the Tudor period; the prose of the Miltonic age outside of Milton and Bunyan; and the Scotch song-writers of the eighteenth century.

Mr. Pancoast's desire to explore some of the odd nooks of literature has led him to include several names that are likely to puzzle a great many teachers of survey courses. Sir John Fortescue is one such; Lord Berners may not be at once recognized until it is remembered that he is the translator of Froissart; not everyone will place Francis Quarles or William Habington or John Earle in the Miltonic period; William Julius Mickle is not startingly known to fame; John Skinner, Jane Elliot, Isabel Pagan, and Caroline Oliphant will cause some trouble until it is remembered they are the authors respectively of "Tullochgorum," "The Flowers of the Forest," "Ca' the Yowes," and the "Land o' the Leal."

On the other hand, the author's desire to broaden the bounds of survey courses has led him to give proper extracts from such minor authors as the Fletchers, Thomas Traherne (two poems); Sir Thomas Overbury (one page); the Earl of Rochester (selection); John Gay (two pages); Lord Bolingbroke (four pages); George Chapman (two pages and over); Hakluyt, Holinshed, John Stow, and a gratifying array of others.

It is, however, in treating the standard authors that this anthology seems weakest. It is not clear, for instance, if all the other Middle English poems

are modernized, why Chaucer should be left so startingly difficult to the student approaching him for the first time; the attempt to illustrate the Elizabethan dramatists by selections of less than a page or two from plays like *Tamburlaine, The White Devil, The Duchess of Malfy*, etc., might better be frankly abandoned; and the choice of seven selections from Shakespere as a dramatist, if it is intended to illustrate Shakespere, is wildly inadequate, and if it is intended to illustrate dramatic poetry, badly culled. But it is in his treatment of Victorian prose that Mr. Pancoast is most inadequate. As he himself confesses, an anthology like this must "provide again those inevitable masterpieces which no well regulated anthology could possibly be without." Yet we find successively that Thackeray is illustrated by two brief selections from the *English Humorists* and the *Roundabout Papers;* Dickens is given one passage from that very uncharacteristic production, *Household Words;* George Eliot is permitted three pages from the introduction to *Felix Holt*(!); and Charles Kingsley is given two pages from *The Hermits*. In each case there seems to be a conscious attempt to avoid the beaten track, and the result is uniformly misleading.

The Romantic poets (excepting William Blake, who is entirely ignored) and the standard Victorian poets are properly represented, although one looks in vain for the names of Coventry Patmore, Sidney Dobell, Locker-Lampson, James Thomson, Francis Thompson, Beddoes, Braed, Henley, Edwin Arnold, John Davidson, Andrew Lang, and others, any of whom might have found a place here. A book which includes such forgotten poets as Thomas Traherne, William Somerville, and Francis Quarles, and which is intended to lure undergraduates into literature, ought, it seems to us, to include some of the poets I have named, even if others are crowded out. Poets of the modern era ought to come closest to the undergraduate.

Mr. Pancoast's attitude toward nineteenth-century poetry is not exceptional; it is the academic attitude, the attitude of academic timidity which refuses to discuss a literary period until it is safely dead. It is the sort of attitude which quarrels violently about such fourth-rate dramatists as the scurrilous Marston and John Bale the tedious and Gascoigne the dull; which mistakes age for a certificate of worth, and confounds source-hunting with literary study; the attitude which sneers at contemporary art merely because it is contemporary. Such is the academic attitude at its worst, that is, in graduate schools and research work—heaven save us! With Mr. Pancoast this intolerance has of course been greatly tempered down to a mild dismay at finding a large section of English literature (and one, it so happens, in which most people are most interested) unmapped and uncatalogued and unticketed generally. It is a wrong attitude, because the business of survey courses is to get people to read, and if those poets and novelists (among this class Mr. Pancoast's sins of omission are also great) who have discussed modern life most authoritatively are ignored, the college professor cannot complain if the

Sophomore prefers the *Saturday Evening Post* to getting up an artificial interest in Gorbuduc.

The problem of English drama in general seems to have baffled the compiler. I have mentioned the feeble representation given the Elizabethan dramatists. Slight as this mention is, with the plays of *Noah's Flood* and *Everyman* in the appendix, it is about the only mention English drama receives in all the eight hundred pages. So far as any further mention of the theater is concerned, the student might well imagine that the closing of the theaters in 1642 ended English drama forever; and he will be puzzled to know what connection there is between Shakespere and Bernard Shaw and why he should study English literary history anyway. Of the antecedent interludes, chronicle plays, and university plays, there is no trace; of the Restoration dramatists, of the plays of Goldsmith and Sheridan, of Colley Cibber and David Garrick, Mr. Pancoast does not allow us to think. Naturally he ignores the dramatic import of the nineteenth century as well (it is, incidentally, the academic thing to do); Macready, Sidney Grundy, Dion Boucicault, Bulwer Lytton, and the author of *Cast* are without the pale of academic respectability, although they kept the torch of English drama aglow when it threatened again and again to disappear forever. Less explicable is the entire omission of Oscar Wilde, either as a poet, as a dramatist, or as a master of prose.

It is, of course, not supposed that Mr. Pancoast could possibly include all these men in one volume. I am interested just now in pointing out what he has done and what he has not done for the information of readers of this magazine. But I am also interested in Mr. Pancoast's collection as an instance of the blindness of the academic attitude toward the needs and interests of healthy young undergraduates who follow Ring W. Lardner and Kipling and Poe and the *Saturday Evening Post* with avid interest. I am interested in pointing out where I think the emphasis of a survey course ought to be, and, although Mr. Pancoast's book throws the emphasis on the other end of the course, it is none the less granted that it is an admirable volume.

But so far as the modern field is concerned, it must be confessed that the anthology is weak. It is of course not possible to give adequate quotations from novelists or dramatists, and Mr. Pancoast's few attempts in this direction are usually failures. It is possible, however, in such a book as this to indicate that an author lived and wrote and died; suffered somewhat; produced certain works of art; to mention these productions and to point out their value and meaning for English literature; to refer to accessible collections of their work; to correct, in short, the false perspective which such a volume gives. A student who, like many students, takes only the general course in English literature would gain from Mr. Pancoast's book, if he read in it alone, an entirely wrong idea of literary history; would rise from his study with the conviction that, except for current magazines and novels and the plays he has seen and Shakespere, the writers of English literature have confined themselves

exclusively to poetry and essays more or less dull. This failure to indicate by some device that English literature has breadth and thickness as well as length is, together with the author's uncertain treatment of the nineteenth century, the great weakness of the present book.

Despite these defects *English Prose and Verse* is for the earlier period—indeed, for most of the periods—the ablest single-volume anthology at present in the field, the most thorough, the most varied, the most comprehensive in its citation of authors. Its serious defects are its neglect of the drama and the novel. For the modern era it is perhaps fortunate that the defects lie where they do, since they concern periods which it is easiest to illustrate from the average college library. The comparative absence of critical material is not an undesirable omission; this anthology will make greater demands on the instructor than either of the older collections. It will require more interpretative work in quiz section and recitation, and abler co-ordination of lectures in the course. These are consummations devoutly to be wished.

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A Student's History of Education. By FRANK PIERREPONT GRAVES. New York: MacMillan, 1915. Pp. xxv+453. $1.25.

Every subject is being called upon today to defend its right to remain in the curriculum. This applies not only to elementary- and secondary-school subjects, but also to college and university studies. Dr. Graves realizes that the history of education is no exception to this rule. In the past, psychology and the history of education have been required courses in most universities and normal schools. Today there is a growing tendency to question the value of these courses in comparison with experimental or statistical courses.

In the Preface the author states his conviction that the modern movement to stress the functional aspects of the history of education is both necessary and wise. He frankly acknowledges that his regard for the classics, philosophy, and general history as college disciplines has caused him heretofore to view with apprehension any disposition to curtail their scope. Hence, in writing this book he has somewhat reluctantly changed his point of view from that which guided him in writing the *History of Education in Three Volumes.* He concludes that antiquarian interests and encyclopedic completeness are alluring, but that they supply no definite demand in the training of teachers; consequently, he has tried to exclude them from the present volume.

Now, what positive contribution can the history of education make in training teachers? Its greatest service is to impel the teacher to analyze his problems more completely, and thus to secure light upon the school practices with which he is himself concerned. The history of education can furnish this impelling force by presenting the teacher with a series of clear-cut views of

past conditions, which set forth the origin and significance of current practices. The criterion which should control the historian in accepting or rejecting historical records is therefore whether or not they aid in the interpretation of present-day problems. The author has aimed to emphasize educational institutions and practices rather than theories.

The volume is divided into four main parts: the first, comprising 50 pages, deals with education in ancient times; the second, comprising 45 pages, discusses the education of the Middle Ages; the third, comprising 105 pages, presents the transition to modern times; and the fourth, comprising about 250 pages, is concerned with modern times. It is worthy of note that more than half of the book is devoted to a discussion of the education of the last two centuries.

Some of the topics treated in the fourth part of the volume are as follows: "Growth of the Democratic Ideal in Education," "Naturalism in Education," "Philanthropy in Education," "Observation and Industrial Training in Education," "The Scientific Movement and the Curriculum," and "Present Day Tendencies in Education."

The illustrations are numerous and admirably chosen to supplement the text. This is a decided advance over the previous volumes by the same author.

Another notable mechanical feature of the book is the outline which appears at the beginning of each chapter. This idea, the author says, was first suggested to him by Professor S. C. Parker's *History of Modern Elementary Education*. The justification for such an outline or epitome of the main points of the chapter is that it serves as a tentative or hypothetical generalization of the facts, thereby facilitating their organization and interpretation.

The author's style is excellent, as indeed it is in all he writes. The narrative grips the reader's interest and holds it throughout. The present volume will probably supplant his history in three volumes in schools that desire to pass lightly over the education of ancient and mediaeval times and dwell at considerable length on more recent educational developments.

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BOOK-NOTES

Contanseau's Pocket Dictionary of the French and English Languages. New ed. thoroughly revised by his son LUDOVIC CONTANSEAU. London: Longmans, Green, & Co., 1915. Pp. x+616. $0.50.

A new edition of one of the most practicable abridged French dictionaries. It contains for its size more words to the square inch than almost any other "pocket dictionary."

FULTON, BRESSLER, and MULLIN. *Questions on Readings in English Literature, A Student's Manual.* New York: Century Co., 1915. Pp. 118. $0.90.

This manual of questions begins with Chaucer, although a brief and inadequate appendix lists questions on Anglo-Saxon literature. The questions are intended to focus attention on reading and interpretation—study questions, in short. The book contains a map of England. One extremely interesting appendix is entitled "Suggestions for Writing Critical Essays."

BOWMAN, BREDVOLD, GREENFIELD, and WEIRICK. *Essays for College English.* Boston: D. C. Heath & Co., 1915. Pp. xix+447.

This collection is intended for students in agricultural colleges. Most of the essays are therefore contemporary, and most of them deal with farming. However, Paul Elmore More, Huxley, Arnold, Frederick J. Turner, Bryce, Ruskin, and Emerson are represented. An Introduction treats of the analysis of essays. Twenty-two selections are given.

HALL, S. ROLAND. *Writing an Advertisement.* Boston: Houghton Mifflin Co., 1915. Pp. xi+217+xvii.

A popular, but authentic and interesting discussion of the problem of advertising copy. Not cluttered up with psychological verbiage.

MURRAY, E. R. *Froebel as a Pioneer in Modern Psychology.* Baltimore: Warwick & Yorke, 1914. Pp. vi+230. $1.25.

Attempts to show that "Froebel's educational theories were based on psychological views of a type much more modern than is . . . . generally understood."

AYRES, LEONARD P., and AYRES, MAY. *Health Work in the Public Schools.* Cleveland: Survey Committee of the Cleveland Foundation, 1915. Pp. 59.

BOBBITT, FRANKLIN. *What the Schools Teach and Might Teach.* Cleveland: Survey Committee of the Cleveland Foundation, 1915. Pp. 108.

AYRES, LEONARD P. *Child Accounting in the Public School.* Cleveland: Survey Committee of the Cleveland Foundation, 1915. Pp. 68.

Notice of these three monographs later.

FAULKNER, RICHARD B. *Tonsils and Adenoids: Treatment and Cure.* Pittsburgh: Blanchard Co., 1915. Pp. 30.

A handbook of medical treatment for diseases of the tonsils and the adenoids. Opposes the surgical treatment. Paper covers.

SANDWICK, RICHARD L. *How to Study and What to Study.* Boston: D. C. Heath & Co., 1915. Pp. v+170.

If this book attempted a thorough discussion of its first part, "The Principles of Effective Study" (86 pages), it would be valuable. However, one-half of the book is given over to a superficial discussion of all the elements in the entire curriculum. It is impossible for a man to exhaust the vexed problem of how to study in 86 pages; it is still more impossible (to make a bull) for him to treat adequately the elements of the curriculum, their justification, method of treatment, and social value in 80 small pages.

LEONARD, WILLIAM ELLERY. *Socrates: Master of Life.* Chicago: Open Court Publishing Co., 1915. Pp. vii+118. $1.00.

Comment later.

CARR, EDWIN HAMILTON. *The Happy Phrase.* New York: Putnam, 1915. Pp. xiv+173. $1.00.

One of those mechanical compilations for the "enrichment of conversation, writing, and public speaking" dedicated to "any person who recognizes herein one of his own original phrases." He will.

WHITNEY, WILLIAM T. *The Socialized Recitation.* New York: A. S. Barnes Co., 1915. Pp. x+100.

The socialized recitation is intended "to do away with passivity in the classroom; to provide opportunity for the natural development of initiative, of activity resulting in originality, of the imaginative powers, and of the realization . . . . of responsibility," etc.

PARTRIDGE, EMELYN NEWCOMB. *Joyful Star: Indian Stories for Camp Fire Girls.* New York: Sturgis & Walton Co., 1915. $1.25.

It would be idle to assert that the Indian was never so idyllic as these pages picture him. The point of the compilation is that the Indian had a mythology beautiful, sad, poetical, and we ought to know something of it. Legends of Indian women from all over America are retold for girls, and told with sympathy.

WILLIAMS, THEODORE CHICKERING (translator). *The Georgics and Eclogues of Virgil: Translation into English Verse.* Cambridge: Harvard University Press, 1915. Pp. 166. $1.00.

Notice later.

HOLMES, ARTHUR. *Backward Children.* (Childhood and Youth Series.) Indianapolis: Bobbs Merrill, 1915. Pp. 247. $1.00.

Review later.

HEALY, WILLIAMS. *Honesty.* (Childhood and Youth Series.) Indianapolis: Bobbs Merrill, 1915. Pp. 220. $1.00.

Review later.

LAPP, JOHN A., and MOTE, CARL H. *Learning to Earn.* Indianapolis: Bobbs Merrill, 1915. Pp. 421. $1.50.

Review later.